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# 1982

## Census of Manufactures

MC82-I-37B

INDUSTRY SERIES

### Aerospace Equipment, Including Parts

Industries 3721, 3724, 3728, 3761 3764, and 3769



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The publications  
from the 1982 Economic and  
Agriculture Censuses are dedicated  
to the memory of Shirley Kallek,  
Associate Director for Economic Fields.  
During her career at the Bureau of the  
Census (1955 to 1983), she continually  
directed efforts to improve  
the timeliness and accuracy of  
economic statistics.

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# 1982 Census of Manufactures

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MC82-I-37B

INDUSTRY SERIES

## Aerospace Equipment, Including Parts

- 3721 Aircraft
  - 3724 Aircraft Engines and Engine Parts
  - 3728 Aircraft Equipment, N.E.C.
  - 3761 Guided Missiles and Space Vehicles
  - 3764 Space Propulsion Units and Parts
  - 3769 Space Vehicle Equipment, N.E.C.
- 

Issued December 1984



**U.S. Department of Commerce**  
**Malcolm Baldrige**, Secretary  
**Clarence J. Brown**, Deputy Secretary  
**Sidney Jones**, Under Secretary for  
Economic Affairs

**BUREAU OF THE CENSUS**  
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Director

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**INDUSTRY DIVISION**  
**Gaylord E. Worden, Chief**

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# INTRODUCTION

## ECONOMIC CENSUSES OVER TIME

The early beginnings of America's industrial output were first measured in the United States in the 1810 Decennial Census and again in 1820, when questions on manufacturing were included with those for population. Beginning with the 1840 Decennial Census, there were enumerations of manufactures and mineral industries at 10-year intervals up to and including the year 1900 for manufactures and 1940 for mineral industries. The latter census was again taken for 1954, 1958, 1963, and 1967.

Because of the increasing dominance of manufacturing in the early 20th century, Congress directed that quinquennial censuses of manufactures be taken beginning in 1905. However, from 1919 through 1939, these censuses were conducted every 2 years. The need for war-related current surveys in the early 1940's postponed the next census of manufactures until 1948 (for 1947). That census was again taken for 1954, 1958, 1963, and 1967.

Retail and wholesale trade data were first collected in 1930, and in 1933 information on selected service industries was added to the data-collection operation. These business censuses, as they were called, were again taken for 1935, 1939 (as part of the 1940 decennial program), 1948, 1954, 1958, 1963, and 1967.

Information on construction industries was obtained first in 1930 and again for 1935 and 1939. Data for the full spectrum of construction industries were not gathered again until 1968 (for 1967).

The need for transportation data to supplement information available from existing governmental or private sources was recognized by Congress in the late 1950's and early 1960's. The census of transportation (consisting of several surveys) was taken first for 1963 and again for 1967.

Since 1967, all of the above censuses have been taken quinquennially as part of the Census Bureau's economic census program. (For the 1977 censuses, the coverage of the service industries was broadened from "selected services" to "all services, except religious organizations and private households." A total of 41 additional four-digit standard industrial classifications<sup>1</sup> (SIC's) in 7 SIC major groups was added to the scope of the census. While most of the industries included for the first time for 1977 were covered again for 1982, some were not, i.e., hospitals; elementary and secondary schools; colleges, universities, and professional schools; junior colleges and technical institutes; labor unions and similar labor organizations; and political organizations.)

The first manufacturing census for an outlying area was conducted in Puerto Rico for the year 1909. Thereafter, with the exception of 1929, a census was taken at 10-year intervals through 1949. The first censuses of retail trade, wholesale trade, and selected service industries in Puerto Rico were conducted for 1939. These censuses also were taken for the years 1949, 1954, 1958, 1963, and 1967. A census of construction industries was introduced first in Puerto Rico for 1967. These censuses of Puerto Rico have been taken since then for the years 1972, 1977, and 1982.

Censuses of manufactures, retail trade, wholesale trade, and selected service industries were conducted in Guam and the

Virgin Islands of the United States for 1958, 1963, 1967, 1972, 1977, and 1982. Censuses of mineral industries were taken in the Virgin Islands of the United States for the years 1958, 1963, and 1967 but not since that time. A census of construction industries was also undertaken in these areas for 1972, 1977, and 1982.

Retail trade, wholesale trade, selected service industries, manufacturing, and construction industries were canvassed for the first time in the Northern Mariana Islands in 1983 (for 1982).

For 1982, the economic censuses and agriculture censuses were conducted concurrently.

## USES OF THE ECONOMIC CENSUSES

The economic censuses are the major source for facts about the structure and functioning of the Nation's economy and provide essential information for government, business, industry, and the general public. They provide an important part of the framework for such composite measures as the gross national product, input-output measures, indexes of industrial production, and indexes measuring productivity and price levels. Information from the censuses is used to establish sampling frames and as benchmarks for current surveys of business activity, which are essential for measuring short-term economic conditions.

State and local governments use census data to assess business activities within their jurisdictions. The private sector uses the data to forecast general economic conditions; analyze sales performance; lay out sales territories; allocate funds for advertising; decide on locations for new plants, warehouses, or stores; and measure potential markets in terms of size, geographic areas, kinds of business, and kinds of products made or sold.

Following every census, thousands of businesses and other users purchase reports. Likewise, census facts are disseminated widely by trade associations, business journals, and newspapers. Volumes containing census statistics are available in most major public and college libraries. All 1982 data are available on microfiche from the U.S. Government Printing Office and most data on computer tape from the Census Bureau. Finally, the more than 50 State Data Centers also are suppliers of economic census statistics.

## AUTHORITY AND SCOPE OF THE ECONOMIC CENSUSES

The economic censuses are required by law under title 13 of the United States Code, sections 131, 191, and 224, which directs that they be taken at 5-year intervals for the years ending in 2 and 7. The 1982 Economic Censuses covered manufacturing, mining, construction industries, retail trade, wholesale trade, service industries, and selected transportation activities. Special programs also cover minority-owned and women-owned businesses. The next economic censuses are scheduled to be taken in 1988 for the year 1987.

<sup>1</sup>Standard Industrial Classification Manual: 1972. For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 041-001-00066-6. 1977 Supplement. Stock No. 003-00500176-0.



# CENSUS OF MANUFACTURES

## General

The 1982 Census of Manufactures is the 31st census of manufactures of the United States. For 1982, it was conducted jointly with the censuses of mineral industries, construction industries, retail and wholesale trades, service industries, selected transportation activities, and minority-owned and women-owned businesses.

This report, from the 1982 Census of Manufactures, is one of a series of 82 industry reports, each of which provides statistics for groups of related industries. Additional separate reports will be issued for each State and on special subjects, such as size of establishments, legal form of organization, and fuels and electric energy consumed.

These separate reports will subsequently be issued as portions of the final census volumes. Volume I, Subject Statistics, will show comparative statistics for industries, States, and standard metropolitan statistical areas. It also will show selected subjects, such as concentration ratios in manufacturing, selected materials consumed, manufacturing activity in government establishments, and water use in manufacturing. Volume II, Industry Statistics, will be a consolidation of reports for the 82 groups of industries showing the same information that is shown in this report. Volume III, Geographic Area Statistics, will contain establishment-based data (number of establishments, employment, payroll, value added by manufacture, and capital expenditures) for each State and its important standard metropolitan statistical areas, counties, and places, by industry groups and important individual industries. Totals for "all manufacturing" will be shown for counties and places with more than 450 manufacturing employees. The introduction to the final volumes will discuss, at greater length, many of the subjects described in this introduction. For example, the volume text will discuss the relationship of value added by manufacture to National income by industry of origin, the changes in statistical concepts over the history of the censuses, and the valuation problems arising from intracompany transfers between manufacturing plants of a company and between manufacturing plants and sales offices and sales branches of a company.

## Scope of Census and Definition of Manufacturing Industries

The 1982 Census of Manufactures covers all establishments employing one person or more primarily engaged in manufacturing as defined in the 1972 Standard Industrial Classification (SIC) Manual and its 1977 Supplement.<sup>1</sup> This is the system of industrial classification developed over a period of years by experts on classification in government and private industry under the guidance of the Office of Management and Budget. This system of classification is in general use among government agencies as well as organizations outside the government.

The SIC manual defines manufacturing as the mechanical or chemical transformation of inorganic or organic substances into new products. The assembly of component parts of products is also considered to be manufacturing if the resulting product is neither a structure nor other fixed improvement. These activities are usually carried on in plants, factories, or mills that characteristically use power-driven machines and materials handling equipment.

<sup>1</sup>Standard Industrial Classification Manual: 1972. For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 041-001-00066-6. 1977 Supplement. Stock No. 003-00500176-0.

## IV INTRODUCTION

Manufacturing production is usually carried on for the wholesale market, for transfers to other plants of the same company, or to the order of industrial users rather than for direct sale to the household consumer. Some manufacturers in a few industries sell chiefly at retail to household consumers through the mail, through house-to-house routes, or through salespersons. Some activities of a service nature (enameling, engraving, etc.) are included in manufacturing when they are performed primarily for the trade. They are considered nonmanufacturing when they are performed primarily to the order of the household consumer.

## Relationship Between Annual Survey of Manufactures and Census of Manufactures

The Bureau of the Census conducts the annual survey of manufactures (ASM) in each of the 4 years between the censuses of manufactures. The ASM is based on a scientifically selected sample of approximately 55,000 establishments and collects the same industry statistics (employment, payroll, value of shipments, etc.) as the census of manufactures. In addition to collecting the information normally requested on the census form, the establishments in the ASM sample are requested to supply detailed information on assets, capital expenditures, retirements, depreciation, rental payments, supplemental labor costs, and costs of purchased services.

## Establishment Basis of Reporting

The census of manufactures and the annual survey of manufactures are conducted on an establishment basis. A company operating at more than one location is required to file a separate report for each location. Companies engaged in distinctly different lines of activity at one location are requested to submit separate reports if the plant records permit such a separation and if the activities are substantial in size.

In 1982, as in earlier years, a minimum size limit was set for including establishments in the census. All establishments employing one person or more at any time during the census year are included. The same size limitation has applied since 1947 in censuses and annual surveys of manufactures. In the 1939 and earlier censuses, establishments with less than \$5,000 value of products were excluded. The change in the minimum size limit in 1947 does not appreciably affect the historical comparability of the census figures except for data on number of establishments for a few industries.

This report excludes information for separately operated administrative offices, warehouses, garages, and other auxiliary units that service manufacturing establishments of the same company (see Auxiliaries).

## Manufacturing Universe and Census Report Forms

The 1982 Census of Manufactures universe includes approximately 345,000 establishments. The amounts of information requested from manufacturing establishments were dependent upon a number of factors. The more important considerations were the size of the company and whether it was included in the annual survey of manufactures. The methods of obtaining information for the various subsets of the universe to arrive at the aggregate figures shown in this publication are described below.

### 1. Small Single-Unit Companies Not Sent a Report Form

In the 1982 Census of Manufactures, approximately 140,000 small single-establishment companies were excluded from filing reports. Selection of these small



establishments was done on an industry-by-industry basis and was based on annual payroll and total shipments data as well as on the industry classification codes contained in the administrative records of other Federal agencies. The cutoffs were selected so that these administrative records cases would account for no more than 3 percent of the value of shipments for the industry. Generally, all single-establishment companies with less than 5 employees were excused, while all establishments with more than 20 employees were mailed report forms.

Information on the physical location of the establishment, as well as information on payrolls, receipts (shipments), and industry classification, was obtained from the administrative records of other Federal agencies under special arrangements, which safeguarded their confidentiality. Estimates of data for these small establishments were developed using industry averages in conjunction with the administrative information. The value of shipments and cost of materials were not distributed among specific products and materials for these establishments but were included in the product and material "not specified by kind" (n.s.k.) categories.

The industry classification codes included in the administrative records files were assigned on the basis of brief descriptions of the general activity of the establishment. As a result, an indeterminate number of establishments were erroneously coded to the four-digit SIC level. This was especially true whenever there was a relatively fine line of demarcation between industries or between manufacturing and nonmanufacturing activity.

Sometimes these administrative record cases were given only a two- or three-digit SIC group. For the 1982 Census of Manufactures, these establishments were sent a separate classification form, which requested information on the products and services of the establishment. This form was used to code many of these establishments to the four-digit SIC level. Establishments that did not return the classification form were coded later to those four-digit SIC industries identified as "not elsewhere classified" (n.e.c.) within the given two- or three-digit industry groups.

As a result of these situations, a number of small establishments may have been misclassified by industry. However, such possible misclassifications have no significant effect on the statistics other than on the number of establishments.

The total establishment count for individual industries should be viewed as an approximation rather than a precise measurement. The counts for establishments with 20 employees or more are far more reliable than the count of total number of establishments.

## 2. Establishments Sent a Report Form

The 205,000 establishments covered in the mail canvass were divided into three groups:

a. **ASM sample establishments**—This group consisted of approximately 55,000 establishments covering all the units of large manufacturing establishments as well as a sample of the medium and smaller establishments. The probability of selection was proportionate to size (see appendix, Annual Survey of Manufactures).

In a census of manufactures year, the ASM report form (MA-1000) replaces the first page of the regular census form for those establishments included in the ASM. In addition to information on employment, payroll,

and other items normally requested on the regular census form, establishments in the ASM sample were requested to supply information on assets, capital expenditures, retirements, depreciation, rental payments, supplemental labor costs, and costs of purchased services. Results of the ASM inquiries are included in tables 3c and 3d of this report.

The census part of the report form is one of approximately 200 versions containing product, material, and special inquiries. The diversity of manufacturing activities necessitated the use of this many forms to canvass the approximately 450 manufacturing industries. Each form was developed for a group of related industries.

Appearing on each form was a list of products primary to the group of related industries, as well as secondary products and miscellaneous services that establishments classified in these industries were likely to be performing. Respondents were requested to identify the products, the value of each product, and, in a large number of cases, the quantity of the product shipped during the survey year. Space was also provided for the respondent to describe products not specifically identified on the form.

The report form also contained a materials-consumed inquiry, which varied from form to form depending on the industries being canvassed. The respondents were asked to review a list of materials generally used in their production processes. From this list, each establishment was requested to identify those materials consumed during the survey year, the cost of each, and, in certain cases, the quantity consumed. Once again, space was provided for the respondent to describe significant materials not identified on the form.

Finally, a wide variety of special inquiries was included to measure activities peculiar to a given industry, such as operations performed and equipment used.

### b. Large and medium establishments (non-ASM)—

Approximately 100,000 establishments were included in this group. A variable cutoff, based on administrative records payroll data and determined on an industry-by-industry basis, was used to select those establishments that were to receive one of the approximately 200 census of manufactures regular forms. The first page, requesting establishment data for items such as employment and payroll, was standard but did not contain the detailed statistics included on the ASM form. The product, material, and special inquiry sections supplied were based on the historical industry classification of the establishment.

### c. Small single-unit establishments (non-ASM)—

This group consisted of approximately 50,000 establishments. For those industries where application of the variable cutoff for administrative records cases resulted in a large number of small establishments being included in the mail canvass, an abbreviated or "short" form was used. These establishments received one of the approximately 80 versions of the short form, which requested summary product and material data and totals but no details on employment, payrolls, cost of materials, inventories, and capital expenditures.

Use of the short form has no adverse effect on published totals for the industry statistics; the same



data were collected on the short as well as the long form. However, detailed information on materials consumed was not collected on the short form; thus its use would increase the values of the n.s.k. categories.

## Auxiliaries

In this industry report, the data on employment and payroll are limited to operating manufacturing establishments. The census report form filed for auxiliaries (ES-9200) requested a description of the activity of the establishments serviced. However, the auxiliaries were coded only to the two-digit major group of the establishments they served; whereas, the operating establishments were coded to a four-digit manufacturing industry. Data for the approximately 10,000 separately operated auxiliaries are included in the paperbound geographic area series, the bound volumes of the census of manufactures, and in a report issued as part of the 1982 Enterprise Statistics survey.

Auxiliaries are establishments whose employees are primarily engaged in performing supporting services for other establishments of the same company, rather than for the general public or for other business firms. They can be at different locations from the establishments served or at the same location as one of those establishments but not operating as an integral part thereof and serving two or more establishments. Where auxiliary operations are conducted at the same location as the manufacturing operation and operate as an integral part thereof, they usually are included in the report for the operating manufacturing establishment.

Included in the broad category of auxiliaries are administrative offices. Employees in administrative offices are concerned with the general management of multiestablishment companies, i.e., with the general supervision and control of two units or more, such as manufacturing plants, mines, sales branches, or stores. The functions of these employees may include (1) program planning, including sales research and coordination of purchasing, production, and distribution; (2) company purchasing, including general contracts and purchasing methods; (3) company financial policy and accounting, tax accounting, company sales and profit reports, and personnel accounting; (4) general engineering, including design of product machinery and equipment, and direction of engineering effort conducted at the individual operation locations; (5) direction of company personnel matters; and (6) legal and patent matters.

Other types of auxiliaries serving the plants or central management of the company include purchasing offices, sales promotion offices, research and development organizations, etc.

## Industry Classification of Establishments

Each of the establishments covered in the census was classified in one of approximately 450 manufacturing industries in accordance with the industry definitions in the SIC system. Under this system of classification, an industry is generally defined as a group of establishments producing a single product or a closely related group of products. The product groupings from which industry classifications are derived are based on considerations such as similarity of manufacturing processes, types of materials used, types of customers, and the like. The resulting group of plants must be significant in terms of its number, value added by manufacture, value of shipments, and number of employees. The system operates in such a way that the definitions progressively became narrower with successive additions of numerical digits. There are 20 major groups (two-digit SIC), 143 industry groups (three-digit SIC), and approximately 450

industries (four-digit SIC). The product classes and products of the manufacturing industries have been assigned codes based on the industry from which they originate. There are about 1,500 classes of products, identified by a five-digit code, and about 11,000 products, identified by a seven-digit code. The seven-digit products are considered the primary products of the industry with the same four digits.

Accordingly, an establishment is usually classified in a particular industry on the basis of its major activity during a particular year, i.e., production of the products primary to that industry exceeds, in value, production of the products primary to any other single industry. In a few instances, however, the industry classification of an establishment is not only determined by the products it makes but also by the process employed in making those products. For example, establishments engaged in blast furnace operations, refining of nonferrous metals from ore, or rolling and drawing of nonferrous metals (processes which involve heavy capitalization in specialized equipment) would be classified according to the process used during a census year. These establishments then would be "frozen" in that industry during the following ASM years.

In either a census or ASM year, establishments included in the ASM sample with certainty weight, other than those involved with heavily capitalized activities described above, are reclassified by industry only if the change in the primary activity from the prior year is significant or the change has occurred for two successive years. This procedure prevents reclassification when there are minor shifts in product mix.

In ASM years, establishments included in the ASM sample with noncertainty weight are not shifted from one industry classification to another. They are retained in the industry where they were classified in the base census year (see appendix, Annual Survey of Manufactures). However, in the following census year, these ASM plants are allowed to shift from one industry to another.

The result of these rules covering the switching of plants from one industry classification to another is that, at the aggregate level, some industries comprise different mixes of establishments between survey years, and establishment data for such industry statistics as employment and payroll may be tabulated in different industries between survey years. Hence, comparisons between prior-year and current-year published totals, particularly at the four-digit SIC level, should be viewed with caution. This is true particularly for the comparison between the data shown for a census year versus the data shown for the previous ASM year.

As previously noted, the small establishments that may have been misclassified by industry are usually administrative-record cases whose industry codes were assigned on the basis of incomplete descriptions of the general activity of the establishment. Such possible misclassifications have no significant effect on the statistics other than on the number of establishments.

While some establishments produce only the primary products of the industry in which they are classified, all establishments of an industry rarely specialize to this extent. The industry statistics (employment, inventories, value added by manufacture, total value of shipments including resales and miscellaneous receipts, etc.) shown in tables 1a through 5a, therefore, reflect not only the primary activities of the establishments in that industry but also their secondary activities. The product statistics in tables 6a through 6c represent the output of all establishments whether or not they are classified in the same industry as the product. For this reason, in relating the industry statistics, especially the value of shipments to the product statistics, the



composition of the industry's output shown in table 5b should be considered.

The extent to which industry and product statistics may be matched with each other is measured by two ratios, which are computed from the figures shown in table 5b. The first of these ratios, called the primary product specialization ratio, measures the proportion of product shipments (both primary and secondary) of the establishments classified in the industry represented by the primary products of those establishments. The second ratio, called the coverage ratio, is the proportion of primary products shipped by the establishments classified in the industry to total shipments of such products by all manufacturing establishments.

However, establishments making products falling into the same industry category may use a variety of processes and materials to produce them. Also, the same industry classification (based on end products) may include both establishments that are highly integrated and those that put only the finishing touches on an already highly fabricated item. For example, the refrigeration industry includes instances of almost complete integration (production of the compressor, condensing unit, electric motor, casting, stamping of the case, and final assembly) all carried on at one plant. On the other hand, the condensing unit, the motor, and the case may be purchased and only assembled into the finished product.

In some instances, separate industry categories have been established for integrated and nonintegrated establishments. For other industries, the census provides separate statistics on the production of intermediate commodities made and used in the producing plant. For some industries characterized by many plants of the same company, separate figures on interplant transfer of products usually are shown.

Differences in the integration of production processes, types of operations, and alternatives in types of materials used should be considered when relating the industry statistics (employment, payrolls, value added, etc.) to the product and material data.

### Value of Shipments for the Industry Compared With Value of Product Shipments

This industry report shows value of shipments data for industries and products. In tables 1a through 5a, these data represent the total value of shipments of all establishments classified in a particular industry. The data include the shipments of the products classified in the industry (primary to the industry), products classified in other industries (secondary to the industry), and miscellaneous receipts (repair work, sale of scrap, research and development, installation receipts, and resales). Product shipments shown in table 6a represent the total value of shipments of products classified as primary to an industry that were shipped by all manufacturing establishments regardless of their industry classification.

### CENSUS DISCLOSURE RULES

In accordance with Federal law governing census reports, no data are published that would disclose the data for an individual establishment or company. However, the number of establishments classified in a specific industry is not considered a disclosure, so this item may be given even though other information is withheld.

The disclosure analysis for the industry statistics in tables 1a through 5a of this report is based on the total value of shipments. When the total value of shipments cannot be shown without disclosing information for individual companies, the complete line has been suppressed. However, the suppressed data are included in higher level totals. Additional disclosure analysis is performed for new capital expenditures that can be suppressed even though value of shipments data are publishable.

### MICROFICHE AND COMPUTER TAPES

All the data in this report are available on microfiche. Selected data are also available on computer tape.

In addition to selected published data being on computer tape, one major data series, the location of manufacturing plants, will be available only on computer tape. This series presents the number of establishments by employment size class by four-digit SIC industry codes for States, counties, and places of 2,500 inhabitants or more. These data are available for both State and county by industry, and State and place by industry.

Microfiche reports are sold by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Computer tapes are sold by the Data User Services Division, Customer Services (Tapes), Bureau of the Census, Washington, D.C. 20233.

### SPECIAL TABULATIONS

Special tabulations of data collected in the 1982 Census of Manufactures may be obtained on computer tape or in tabular form. The data will be in summary form and subject to the same rules prohibiting disclosure of confidential information (including name, address, kind of business, or other data for individual business establishments or companies) as are the regular publications.

Special tabulations are prepared on a cost basis. A request for a cost estimate, as well as exact specifications on the type and format of the data to be provided, should be directed to the Chief, Industry Division, Bureau of the Census, Washington, D.C. 20233.

### ABBREVIATIONS AND SYMBOLS

The following abbreviations and symbols are used in this publication:

- Represents zero.
- (D) Withheld to avoid disclosing data for individual companies; data are included in higher level totals.
- (NA) Not available.
- (NC) Not comparable.
- (S) Withheld because estimate did not meet publication standards on the basis of either the response rate or a consistency review.
- (X) Not applicable.
- (Z) Less than half the unit shown.
- n.e.c. Not elsewhere classified.
- n.s.k. Not specified by kind.
- pt. Part.
- r Revised.
- SIC Standard Industrial Classification.

Other abbreviations, such as lb, gal, yd, doz, bbl, and s tons, are used in the customary sense.

# Users' Guide for Locating Statistics

[For explanation of terms, see appendixes]

	Item	Four-digit industry statistics		
		Historical	Operating ratios	By geographic area
1	Number of companies . . . . .	1a		
2	Number of manufacturing establishments . . . . .	1a		2
	Employment and payroll:			
3	Number of employees . . . . .	1a	1b	2
4	Payroll . . . . .	1a	1b	2
5	Supplemental labor costs . . . . .			
6	Production workers . . . . .	1a	1b	2
7	Production-worker hours . . . . .	1a	1b	2
8	Production-worker wages . . . . .	1a	1b	2
	Shipments, cost of materials, and value added:			
9	Value of shipments (four-digit) . . . . .	1a	1b	2
10	Product class shipments (five-digit) . . . . .			
11	Product shipments (seven-digit) . . . . .			
12	Value added by manufacture . . . . .	1a	1b	2
13	Cost of materials . . . . .	1a	1b	2
14	Fuels and electric energy . . . . .			
15	Materials consumed by kind . . . . .			
	Inventories:			
16	Total, end of year . . . . .	1a		
17	By method of valuation . . . . .			
18	By stage of fabrication . . . . .			
	Capital expenditures, assets, rental payments, and purchased services:			
19	New capital expenditures . . . . .	1a		2
20	Used plant and equipment expenditures . . . . .			
21	Gross assets . . . . .			
22	Depreciation . . . . .			
23	Retirements of buildings and machinery . . . . .			
24	Rental payments . . . . .			
25	Purchased services . . . . .			
	Ratios:			
26	Specialization . . . . .	1a		
27	Coverage . . . . .	1a		

\*Number of companies with shipments of over \$100 thousand.

\*\*Detailed information shown.



in This Report by Table Number

Four-digit industry statistics – Con.				Five-digit product class and seven-digit product statistics				
Summary and supplemental	By employment size	By industry and product class specialization	Materials consumed by kind	Industry-product analysis	Product shipments	Product class by geographic area	Historical product class	
3a					*6a			1
**3a	4	5a						2
3a	4	5a						3
3a	4	5a						4
**3d								5
**3a	4	5a						6
**3a	4	5a						7
3a	4	5a						8
3a	4	5a		5b, 5c				9
				5b, 5c	6a	6b	6c	10
					6a			11
3a	4	5a						12
**3a	4	5a						13
3a, 3d			7					14
								15
3b, 3c	4							16
3b, 3c								17
3b								18
**3a, **3d	4	5a						19
**3a, **3d								20
**3d								21
**3d								22
**3d								23
**3d								24
**3d								25
3a				5b				26
3a				5b				27





# Aerospace Equipment, Including Parts

## CONTENTS

[Page numbers listed here omit the prefix that appears as part of the number of each page]

	Page
Introduction . . . . .	III
Users' Guide for Locating Statistics in This Report by Table Number . . . . .	VIII
Description of Industries and Summary of Findings . . . . .	2

### TABLES

#### INDUSTRY STATISTICS

1a. Historical Statistics for the Industry: 1982 and Earlier Years . . . . .	6
1b. Selected Operating Ratios for the Industry: 1982 and Earlier Years . . . . .	7
2. Industry Statistics for Selected States: 1982 and 1977 . . . . .	9
3a. Summary Statistics for the Industry: 1982 . . . . .	11
3b. Value of Inventories for the Industry: End of 1981 and 1982 . . . . .	11
3c. Inventories by Specific Method of Valuation for the Industry: End of 1982 . . . . .	12
3d. Supplemental Industry Statistics Based on Sample Estimates: 1982 . . . . .	12
4. Industry Statistics by Employment Size of Establishment: 1982 . . . . .	13
5a. Industry Statistics by Industry and Primary Product Class Specialization: 1982 . . . . .	14

#### PRODUCT STATISTICS

5b. Industry-Product Analysis—Value of Shipments and Primary Product Shipments, Specialization and Coverage Ratios for the Industry: 1982 and Earlier Census Years . . . . .	16
5c-1. Industry-Product Analysis—Shipments by Product Class and Industry: 1982 . . . . .	16
5c-2. Industry-Product Analysis—Other Industries With Shipments of Primary Products: 1982 . . . . .	18
6a. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1982 and 1977 . . . . .	18
6b. Product Classes—Value of Shipments by All Producers for Specified States: 1982 and 1977 . . . . .	22
6c. Product Classes—Value Shipped by All Producers: 1982 and Earlier Years . . . . .	23

#### MATERIAL STATISTICS

7. Materials Consumed by Kind: 1982 and 1977 . . . . .	23
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### APPENDIXES

A. Explanation of Terms . . . . .	A-1
B. Annual Survey of Manufactures Sampling and Estimating Methodologies . . . . .	B-1

Publication Program . . . . .	Inside back cover
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# DESCRIPTION OF INDUSTRIES AND SUMMARY OF FINDINGS

## AEROSPACE EQUIPMENT, INCLUDING PARTS

This report shows 1982 Census of Manufactures statistics for establishments classified in each of the following industries:

### SIC Code and Title

3721	Aircraft
3724	Aircraft Engines and Engine Parts
3728	Aircraft Equipment, N.E.C.
3761	Guided Missiles and Space Vehicles
3764	Space Propulsion Units and Parts
3769	Space Vehicle Equipment, N.E.C.

The industry statistics (employment, payroll, cost of materials, value of shipments, inventories, etc.) are reported for each establishment as a whole. Aggregates of such data for an industry reflect not only the primary activities of the establishments but also their activities in the manufacture of secondary products as well as their miscellaneous activities (contract work on materials owned by others, repair work, etc.). This fact should be taken into account in comparing industry statistics (tables 1a-5a) with product statistics (table 6a) showing shipments by all industries of the primary products of the specified industry. The extent of the "product mix" is indicated in table 5b, which shows the value of primary and secondary products shipped by establishments classified in the specified industry and also the value of primary products of the industry shipped as secondary products by establishments classified in other industries.

Small single-unit companies with up to 20 employees (cutoff varied by industry) were excluded from the mail portion of the census. For these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated), data on payrolls and receipts were obtained from administrative records of other government agencies. The remaining statistics were developed from industry averages.

Establishment data were tabulated based on industry definitions contained in the 1972 Standard Industrial Classification (SIC) Manual and its 1977 supplement.<sup>1</sup>

## INDUSTRY 3721, AIRCRAFT

This industry comprises establishments primarily engaged in the manufacture or assembly of complete aircraft. It also includes establishments primarily engaged in research and development on aircraft or in factory-type aircraft modification on a contract or fee basis. Establishments primarily engaged in the manufacture of engines, propellers, and other aircraft parts and auxiliary equipment are classified in industries 3724 and 3728, and those in the production of guided missiles and space vehicles and parts are classified in SIC group 376.

In the 1982 Census of Manufactures, Industry 3721, Aircraft, recorded employment of 275.4 thousand. The total value of shipments for establishments classified in this industry was \$28,047 million.

The value of shipments figure shown above is in current (1982) prices. All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The employment figure shown above was 24 percent above the 222.7 thousand reported in 1977. The leading States in employment in 1982 were California, Washington, Kansas, and Texas, accounting for approximately 65 percent of the industry's 1982 employment. Data for Washington have been withheld to avoid disclosing data for individual companies. This represents a shift from 1977 when California, Texas, Washington, and New York accounted for approximately 65 percent of the industry's employment.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. In current prices, industry 3721 shipped \$23,610 million of products primary to the industry, \$3,634 million of secondary products, and had \$803 million miscellaneous receipts. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 87 percent (specialization ratio). In 1977, this specialization ratio was 83 percent.

Establishments in this industry also accounted for 97 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1977, the coverage ratio was 98 percent. The products primary to industry 3721, no matter in what industry they were produced, appear in table 3 and aggregate to \$24,235 million in current prices.

The total cost of materials and services used by establishments classified in the aircraft industry amounted to \$15,717 million in current prices. Data on specific materials consumed appear in table 4.

Establishments of single-unit companies in this industry with up to 20 employees were excluded from the mail portion of the census. There were no establishments for which administrative records were used for this industry. A small number of larger establishments whose reports were not received at the time the data were tabulated were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for less than 1 percent of total value of shipments.

## INDUSTRY 3724, AIRCRAFT ENGINES AND ENGINE PARTS

This industry comprises establishments primarily engaged in manufacturing aircraft engines and engine parts. Research and development on aircraft engines is included in this industry.

<sup>1</sup>Standard Industrial Classification Manual: 1972. For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 041-001-00066-6. 1977 Supplement. Stock No. 003-005-00176-0.



Establishments primarily engaged in manufacturing guided missile and space vehicle propulsion units and parts are classified in industry 3764.

In the 1982 Census of Manufactures, Industry 3724, Aircraft Engines and Engine Parts, recorded employment of 130.5 thousand. The total value of shipments for establishments classified in this industry was \$13,799 million.

The value of shipments figure shown above is in current (1982) prices. All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The employment figure shown above was 23 percent above the 106.1 thousand reported in 1977. The leading States in employment in 1982 were Connecticut, Ohio, Indiana, and Massachusetts, accounting for approximately 66 percent of the industry's 1982 employment. Data for Connecticut, Indiana, and Massachusetts have been withheld to avoid disclosing data for individual companies. These same States were the leaders in 1977, when they accounted for approximately 70 percent of the industry's employment.

Compared with 1981, employment decreased 7 percent. The 1981 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. In current prices, industry 3724 shipped \$11,183 million of products primary to the industry, \$1,999 million of secondary products, and had \$616 million miscellaneous receipts. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 85 percent (specialization ratio). In 1977, this specialization ratio was 81 percent.

Establishments in this industry also accounted for 96 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1977, the coverage ratio was 95 percent. The products primary to industry 3724, no matter in what industry they were produced, appear in table 3 and aggregate to \$11,641 million in current prices.

The total cost of materials and services used by establishments classified in the aircraft engines and engine parts industry amounted to \$6,258 million in current prices. Data on specific materials consumed appear in table 4.

Establishments of single-unit companies in this industry with up to 20 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 1 percent of total value of shipments.

## **INDUSTRY 3728, AIRCRAFT EQUIPMENT, N.E.C.**

This industry comprises establishments primarily engaged in manufacturing aircraft parts and auxiliary equipment, not elsewhere classified. Research and development on aircraft parts is included in this industry. Establishments primarily engaged in manufacturing or assembling complete aircraft are classified in

industry 3721, aircraft engines and parts in industry 3724, aeronautical instruments in industry 3811, aeronautical electrical equipment in industry 3694, aeronautical navigation equipment in industry 3622, and guided missile and space vehicle parts and auxiliary equipment in industry 3769.

In the 1982 Census of Manufactures, Industry 3728, Aircraft Equipment, N.E.C., recorded employment of 133.3 thousand. The total value of shipments for establishments classified in this industry was \$10,222 million.

The value of shipments figure shown above is in current (1982) prices. All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The employment figure shown above was 43 percent above the 102.0 thousand reported in 1977. The leading States in employment in 1982 were California, Washington, Texas, and Ohio, accounting for approximately 60 percent of the industry's 1982 employment. Data for Washington, Texas, and Ohio have been withheld to avoid disclosing data for individual companies. This represents a shift from 1977 when California, Washington, Ohio, and Kansas accounted for approximately 64 percent of the industry's employment.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. In current prices, industry 3728 shipped \$7,024 million of products primary to the industry, \$2,924 million of secondary products, and had \$240 million miscellaneous receipts. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 71 percent (specialization ratio). In 1977, this specialization ratio was 72 percent.

Establishments in this industry also accounted for 65 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1977, the coverage ratio was 57 percent. The products primary to industry 3728, no matter in what industry they were produced, appear in table 3 and aggregate to \$10,789 million in current prices.

The total cost of materials and services used by establishments classified in the aircraft equipment, n.e.c., industry amounted to \$3,995 million in current prices. Data on specific materials consumed appear in table 4.

Establishments of single-unit companies in this industry with up to 20 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 2 percent of total value of shipments.

## **INDUSTRY 3761, GUIDED MISSILES AND SPACE VEHICLES**

This industry comprises establishments primarily engaged in manufacturing complete guided missiles and space vehicles. Research and development and other services on or for guided missiles and space vehicles are included in this industry. Establishments primarily engaged in manufacturing guided



missile and space vehicle propulsion units and propulsion unit parts are classified in industry 3764; space satellite, guided missile, and space vehicle airborne and ground guidance, checkout and launch electronic systems and components in industry 3662; and guided missile and space vehicle airframes, nose cones, and space capsules in industry 3769.

In the 1982 Census of Manufactures, Industry 3761, Guided Missiles and Space Vehicles, recorded employment of 99.6 thousand. The total value of shipments for establishments classified in this industry was \$10,219 million.

The value of shipments figure shown above is in current (1982) prices. All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The employment figure shown above was 6 percent above the 94.0 thousand reported in 1977. The leading States in employment in 1982 were California, Florida, Arizona, and Missouri, accounting for approximately 94 percent of the industry's 1982 employment. Data for Florida, Arizona, and Missouri have been withheld to avoid disclosing data for individual companies. This represents a shift from 1977 when California, Florida, Colorado, and Arizona accounted for approximately 91 percent of the industry's employment.

Compared with 1981, employment decreased 6 percent. The 1981 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

Establishments in this industry also accounted for 86 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1977, the coverage ratio was 91 percent. The products primary to industry 3761, no matter in what industry they were produced, appear in table 3 and aggregate to \$8,586 million in current prices.

The total cost of materials and services used by establishments classified in the guided missiles and space vehicles industry amounted to \$3,652 million in current prices. Data on specific materials consumed appear in table 4.

Establishments of single-unit companies in this industry with up to 20 employees were excluded from the mail portion of the census. There were no establishments for which administrative records were used for this industry. A small number of larger establishments whose reports were not received at the time the data were tabulated were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 5 percent of total value of shipments.

## **INDUSTRY 3764, SPACE PROPULSION UNITS AND PARTS**

This industry comprises establishments primarily engaged in manufacturing guided missile and space vehicle propulsion units and propulsion unit parts. This industry also includes establishments primarily engaged in research and development on guided missile and space vehicle propulsion units and propulsion unit parts.

In the 1982 Census of Manufactures, Industry 3764, Space Propulsion Units and Parts, recorded employment of 25.3 thousand. The total value of shipments for establishments classified in this industry was \$2,221 million.

The value of shipments figure shown above is in current (1982) prices. All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The employment figure shown above was 36 percent above the 18.6 thousand reported in 1977. The leading States in employment in 1982 were California, Utah, Michigan, and Alabama, accounting for approximately 79 percent of the industry's 1982 employment. Data for Utah, Michigan, and Alabama have been withheld to avoid disclosing data for individual companies. This represents a shift from 1977 when California, Utah, New York, and Ohio accounted for approximately 85 percent of the industry's employment.

Establishments in this industry accounted for 89 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1977, the coverage ratio was 88 percent. The products primary to industry 3764, no matter in what industry they were produced, appear in table 3 and aggregate to \$2,199 million in current prices.

The total cost of materials and services used by establishments classified in the space propulsion units and parts industry amounted to \$737 million in current prices. Data on specific materials consumed appear in table 4.

Establishments of single-unit companies in this industry with up to 20 employees were excluded from the mail portion of the census. There were no establishments for which administrative records were used for this industry. A small number of larger establishments whose reports were not received at the time the data were tabulated were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for less than 1 percent of total value of shipments.

## **INDUSTRY 3769, SPACE VEHICLE EQUIPMENT, N.E.C.**

This industry comprises establishments primarily engaged in manufacturing guided missile and space vehicle parts and auxiliary equipment, not elsewhere classified. Research and development on guided missile and space vehicle parts and equipment, not elsewhere classified, is also included in this industry. Establishments primarily engaged in manufacturing guided missile and space vehicle propulsion units and unit parts are classified in industry 3764, warheads for missiles in industry 3483, and navigational and guidance systems in industry 3662.

In the 1982 Census of Manufactures, Industry 3769, Space Vehicle Equipment, N.E.C., recorded employment of 21.4 thousand. The total value of shipments for establishments classified in this industry was \$1,958 million.

The value of shipments figure shown above is in current (1982) prices. All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

Compared with 1981, employment increased 20 percent. The 1981 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses. The leading States in employment in 1982 were Colorado, Pennsylvania, Louisiana, and California,



accounting for approximately 85 percent of the industry's 1982 employment. Data for Colorado, Pennsylvania, and Louisiana have been withheld to avoid disclosing data for individual companies. This represents a shift from 1977 when Pennsylvania, Louisiana, California, and Connecticut accounted for approximately 76 percent of the industry's employment.

Establishments in this industry accounted for 46 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). The products primary to industry 3769, no matter in what industry they were produced, appear in table 3 and aggregate to \$2,574 million in current prices.

The total cost of materials and services used by establishments classified in the space vehicle equipment, n.e.c., industry amounted to \$645 million in current prices. Data on specific materials consumed appear in table 4.

Establishments of single-unit companies in this industry with up to 20 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 5 percent of total value of shipments.

# Table 1a. Historical Statistics for the Industry: 1982 and Earlier Years

[Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year <sup>1</sup>	All establishments <sup>3</sup>			All employees		Production workers			Value added by manufacture <sup>4</sup> (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	End-of-year inventory <sup>5</sup> (million dollars)	Ratios	
	Companies <sup>2</sup> (no.)	Total (no.)	With 20 employees or more (no.)	Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						Specialization (per cent)	Coverage (per cent)
INDUSTRY 3721, AIRCRAFT															
1982 Census.....	137	166	87	275.4	7 750.1	138.8	272.7	3 521.7	15 717.4	15 716.6	28 047.4	840.3	19 327.8	87	97
1981 ASM.....	(NA)	(NA)	(NA)	301.1	7 954.8	156.5	312.0	3 615.6	15 488.8	15 651.8	29 832.8	736.1	15 195.6	(NA)	(NA)
1980 ASM.....	(NA)	(NA)	(NA)	281.1	6 667.4	155.0	310.0	3 144.0	14 601.6	14 642.1	26 782.4	687.6	12 974.0	(NA)	(NA)
1979 ASM.....	(NA)	(NA)	(NA)	273.4	5 723.4	154.2	310.3	2 807.2	12 173.5	12 382.2	22 521.7	604.1	10 071.3	(NA)	(NA)
1978 ASM.....	(NA)	(NA)	(NA)	237.7	4 756.2	134.7	267.7	2 244.4	9 120.5	8 754.5	17 052.1	351.9	7 756.0	(NA)	(NA)
1977 Census.....	151	176	74	222.7	3 975.9	119.0	232.7	1 765.2	8 134.1	6 742.7	14 834.2	202.4	6 618.5	83	98
1976 ASM.....	(NA)	(NA)	(NA)	208.7	3 563.0	116.3	230.1	1 633.1	6 823.3	6 101.7	13 419.3	150.4	6 308.5	(NA)	(NA)
1975 ASM.....	(NA)	(NA)	(NA)	219.9	3 439.1	122.3	244.8	1 559.5	7 015.7	5 742.5	12 202.5	123.0	6 822.1	(NA)	(NA)
1974 ASM.....	(NA)	(NA)	(NA)	238.7	3 298.4	137.6	268.3	1 567.5	6 972.3	5 183.8	11 665.4	111.0	6 155.3	(NA)	(NA)
1973 ASM.....	(NA)	(NA)	(NA)	238.5	3 059.4	137.6	265.7	1 453.3	6 635.4	4 700.1	10 666.0	119.9	5 419.9	(NA)	(NA)
1972 Census.....	141	168	86	231.8	2 867.1	131.0	259.1	1 332.3	5 083.0	4 028.7	8 779.3	57.1	6 375.3	86	96
1971 ASM.....	(NA)	(NA)	(NA)	237.8	2 738.5	128.1	252.4	1 225.9	5 055.0	4 373.5	10 021.0	59.2	6 003.8	(NA)	(NA)
1970 ASM.....	(NA)	(NA)	(NA)	320.2	3 465.0	170.0	334.3	1 591.2	5 810.8	5 229.3	11 462.3	181.4	6 958.7	(NA)	(NA)
1969 ASM.....	(NA)	(NA)	(NA)	395.8	4 066.7	223.0	438.4	1 851.4	6 686.8	5 759.0	12 445.7	339.8	7 435.9	(NA)	(NA)
1968 ASM.....	(NA)	(NA)	(NA)	417.9	3 907.1	245.7	502.0	1 925.8	6 553.6	6 460.8	13 014.4	281.9	6 250.7	(NA)	(NA)
1967 Census.....	91	125	83	386.8	3 569.0	230.6	489.9	1 806.7	5 447.6	5 632.2	11 079.8	408.2	5 253.3	83	97
INDUSTRY 3724, AIRCRAFT ENGINES AND ENGINE PARTS															
1982 Census.....	279	338	223	130.5	3 540.3	76.4	153.7	1 816.3	7 565.2	6 258.9	13 799.1	440.5	4 690.1	85	96
1981 ASM.....	(NA)	(NA)	(NA)	140.0	3 562.8	82.9	164.2	1 887.6	6 890.9	6 980.9	13 777.4	504.6	4 101.8	(NA)	(NA)
1980 ASM.....	(NA)	(NA)	(NA)	140.6	3 218.5	85.3	174.2	1 723.7	6 957.7	5 734.0	12 027.7	460.1	3 769.0	(NA)	(NA)
1979 ASM.....	(NA)	(NA)	(NA)	134.8	2 823.7	81.3	170.7	1 518.1	5 991.3	4 374.8	9 682.4	383.1	2 835.5	(NA)	(NA)
1978 ASM.....	(NA)	(NA)	(NA)	115.7	2 305.4	69.6	145.8	1 192.9	4 438.9	3 508.8	7 510.1	266.2	1 947.1	(NA)	(NA)
1977 Census.....	226	269	177	106.1	1 939.4	62.4	128.7	970.0	3 599.1	2 761.8	6 272.3	174.9	1 440.2	81	95
1976 ASM.....	(NA)	(NA)	(NA)	99.3	1 629.5	57.0	115.4	788.2	3 126.2	2 477.9	5 634.4	185.1	1 210.4	(NA)	(NA)
1975 ASM.....	(NA)	(NA)	(NA)	108.0	1 630.5	61.9	130.3	814.0	2 989.8	2 440.9	5 346.4	150.1	1 303.9	(NA)	(NA)
1974 ASM.....	(NA)	(NA)	(NA)	115.9	1 603.3	67.9	142.5	801.2	2 965.8	2 108.4	4 880.9	104.9	1 238.3	(NA)	(NA)
1973 ASM.....	(NA)	(NA)	(NA)	114.0	1 455.4	67.3	139.2	721.9	2 605.2	1 895.2	4 399.8	87.2	1 016.1	(NA)	(NA)
1972 Census <sup>5</sup> .....	189	232	156	104.7	1 256.6	60.4	125.0	603.4	1 991.7	1 742.1	3 640.2	73.0	868.2	87	94
INDUSTRY 3728, AIRCRAFT EQUIPMENT, N.E.C.															
1982 Census.....	910	966	420	133.3	3 443.6	73.7	147.3	1 660.5	6 213.3	3 994.7	10 221.9	400.7	3 814.4	71	65
1981 ASM.....	(NA)	(NA)	(NA)	140.3	3 252.8	84.2	173.5	1 740.0	5 716.0	3 473.7	8 871.4	396.3	3 349.6	(NA)	(NA)
1980 ASM.....	(NA)	(NA)	(NA)	158.9	3 409.5	94.9	193.3	1 797.4	6 062.6	4 016.2	9 229.3	469.8	3 572.7	(NA)	(NA)
1979 ASM.....	(NA)	(NA)	(NA)	137.5	2 640.4	84.0	169.1	1 400.6	4 740.7	3 010.8	7 224.3	313.6	2 363.4	(NA)	(NA)
1978 ASM.....	(NA)	(NA)	(NA)	110.2	2 016.6	64.2	126.5	995.2	3 540.2	2 141.3	5 414.5	156.5	1 563.2	(NA)	(NA)
1977 Census.....	681	728	298	102.0	1 705.2	58.7	113.7	828.3	2 998.4	1 747.7	4 760.6	131.1	1 243.1	72	57
1976 ASM.....	(NA)	(NA)	(NA)	100.0	1 472.5	63.9	126.6	863.3	2 785.4	1 507.4	4 409.3	95.6	1 329.3	(NA)	(NA)
1975 ASM.....	(NA)	(NA)	(NA)	110.2	1 531.6	71.4	148.3	921.6	2 795.7	1 656.1	4 445.4	95.7	1 466.9	(NA)	(NA)
1974 ASM.....	(NA)	(NA)	(NA)	107.4	1 387.6	72.1	151.4	857.4	2 521.8	1 536.1	3 892.9	67.1	1 470.4	(NA)	(NA)
1973 ASM.....	(NA)	(NA)	(NA)	106.3	1 269.8	70.8	145.3	755.0	2 219.3	1 318.3	3 466.7	51.1	1 270.1	(NA)	(NA)
1972 Census <sup>5</sup> .....	649	694	313	102.2	1 158.1	68.1	139.5	677.9	2 048.9	1 064.0	3 031.9	38.9	1 177.2	77	66
INDUSTRY 3761, GUIDED MISSILES AND SPACE VEHICLES															
1982 Census.....	16	29	28	99.6	3 159.4	35.9	70.5	915.7	7 025.5	3 652.1	10 218.6	293.3	1 685.3	83	86
1981 ASM.....	(NA)	(NA)	(NA)	106.5	3 082.0	33.8	65.4	795.3	6 092.7	2 853.5	8 873.2	255.0	1 244.2	(NA)	(NA)
1980 ASM.....	(NA)	(NA)	(NA)	106.5	2 890.5	36.6	75.1	800.8	5 822.9	2 725.4	8 265.9	234.4	1 189.4	(NA)	(NA)
1979 ASM.....	(NA)	(NA)	(NA)	104.6	2 586.2	39.8	77.7	788.9	5 046.0	2 280.4	7 119.7	195.3	968.8	(NA)	(NA)
1978 ASM.....	(NA)	(NA)	(NA)	93.8	2 122.2	33.4	65.5	623.3	4 176.6	1 877.2	5 990.2	135.3	673.3	(NA)	(NA)
1977 Census.....	20	40	37	94.0	1 931.5	35.2	67.0	603.8	3 564.8	1 691.3	5 314.4	125.6	600.2	87	91
1976 ASM.....	(NA)	(NA)	(NA)	106.2	2 093.1	38.8	76.0	633.5	3 885.6	1 865.5	5 521.4	88.3	884.3	(NA)	(NA)
1975 ASM.....	(NA)	(NA)	(NA)	110.8	2 017.0	41.4	80.1	650.0	3 687.8	1 955.1	5 503.2	85.4	654.6	(NA)	(NA)
1974 ASM.....	(NA)	(NA)	(NA)	116.9	1 941.7	44.0	87.0	603.9	3 326.7	1 963.7	5 279.2	86.8	491.8	(NA)	(NA)
1973 ASM.....	(NA)	(NA)	(NA)	117.3	1 840.0	44.6	85.5	577.1	3 176.0	1 494.5	4 698.2	78.4	451.0	(NA)	(NA)
1972 Census.....	22	70	57	118.4	1 751.7	47.6	91.5	575.9	2 948.7	1 166.3	4 123.6	62.9	463.0	89	95
1971 ASM.....	(NA)	(NA)	(NA)	131.9	1 765.7	51.0	95.5	564.8	2 869.8	1 080.5	3 989.8	56.1	477.9	(NA)	(NA)
1970 ASM.....	(NA)	(NA)	(NA)	142.8	1 824.1	50.1	96.2	535.6	2 853.4	1 023.3	3 970.3	62.1	397.2	(NA)	(NA)
1969 ASM.....	(NA)	(NA)	(NA)	177.8	2 121.9	58.4	115.1	604.1	3 480.5	1 151.7	4 632.2	88.8	489.2	(NA)	(NA)
1968 ASM.....	(NA)	(NA)	(NA)	205.9	2 256.4	71.9	146.6	672.7	3 497.8	1 359.9	4 857.8	117.1	573.0	(NA)	(NA)
1967 Census.....	25	65	59	201.4	2 098.7	70.2	142.9	587.0	3 338.8	1 301.7	4 640.5	111.4	485.4	89	86
INDUSTRY 3764, SPACE PROPULSION UNITS AND PARTS															
1982 Census.....	20	27	25	25.3	737.1	10.8	23.4	263.1	1 534.0	737.2	2 221.2	95.8	276.0	89	89
1981 ASM.....	(NA)	(NA)	(NA)	26.7	699.8	10.7	23.0	239.3	1 338.8	647.4	1 959.8	73.4	200.5	(NA)	(NA)
1980 ASM.....	(NA)	(NA)	(NA)	25.5	607.3	10.8	22.6	220.4	1 150.1	540.6	1 652.7	60.4	171.5	(NA)	(NA)
1979 ASM.....	(NA)	(NA)	(NA)	22.2	493.4	9.6	20.5	169.2	856.5	411.9	1 277.6	43.7	134.2	(NA)	(NA)
1978 ASM.....	(NA)	(NA)	(NA)	20.1	414.1	8.4	17.5	140.1	764.2	343.2	1 113.8	27.6	140.2	(NA)	(NA)
1977 Census.....	18	25	24	18.6	356.6	7.1	14.9	111.5	620.7	316.4	945.5	25.3	167.5	92	88
1976 ASM.....	(NA)	(NA)	(NA)	19.0	334.2	7.1	15.2	104.1	582.7	272.3	862.9	20.2	167.7	(NA)	(NA)
1975 ASM.....	(NA)	(NA)	(NA)	20.5	335.0	7.9	16.6	105.7	579.6	323.4	901.7	14.6	179.4	(NA)	(NA)
1974 ASM.....	(NA)	(NA)	(NA)	21.0	314.7	8.5	17.1	99.0	587.8	313.5	888.9	21.3	175.7	(NA)	(NA)
1973 ASM.....	(NA)	(NA)	(NA)	22.5	315.5	8.7	18.2	99.1	607.5	320.9	948.9	16.0	167.8	(NA)	(NA)
1972 Census <sup>5</sup> .....	22	29	28	20.8	276.2	8.1	17.3	87.6	506.6	220.7	716.3	18.4	174.2	91	87
INDUSTRY 3769, SPACE VEHICLE EQUIPMENT, N.E.C.															
1982 Census.....	45	49	33	21.4	584.6	13.0</									



**Table 1a. Historical Statistics for the Industry: 1982 and Earlier Years—Con.**

[Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year <sup>1</sup>	Com- panies <sup>2</sup> (no.)	All establishments <sup>3</sup>		All employees		Production workers			Value added by manufac- ture <sup>4</sup> (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expend- itures (million dollars)	End-of- year inventories <sup>4</sup> (million dollars)	Ratios	
		Total (no.)	With 20 employ- ees or more (no.)	Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						Spe- cial- ization (per- cent)	Cover- age (per- cent)
	INDUSTRY 3769, SPACE VEHICLE EQUIPMENT, N.E.C.—Con.														
1977 Census-----	41	42	25	7.2	139.2	3.9	8.3	55.3	236.3	110.1	339.4	13.3	29.8	85	(D)
1976 ASM-----	(NA)	(NA)	(NA)	16.5	295.5	6.7	14.1	90.5	558.4	209.2	757.3	17.5	80.7	(NA)	(NA)
1975 ASM-----	(NA)	(NA)	(NA)	16.3	272.3	7.0	14.4	93.0	496.5	180.5	655.6	9.2	71.8	(NA)	(NA)
1974 ASM-----	(NA)	(NA)	(NA)	16.5	243.4	7.4	15.6	88.8	400.1	192.4	595.0	15.6	93.0	(NA)	(NA)
1973 ASM-----	(NA)	(NA)	(NA)	20.2	278.7	7.6	15.6	85.1	499.5	270.7	766.0	9.6	96.4	(NA)	(NA)
1972 Census <sup>5</sup> -----	45	48	39	20.9	289.3	7.9	16.9	83.3	513.9	286.3	788.2	11.0	91.2	79	66

<sup>1</sup>In annual survey of manufactures (ASM) years, data are estimates based on a representative sample of establishments canvassed annually and may differ from results of a complete canvass of all establishments. ASM publication shows percentage standard errors. Unless otherwise noted, for data prior to 1967, see 1967 Census of Manufactures, vol. II, table 1 of the Industry chapter.

<sup>2</sup>For the census, a company is defined as a business organization consisting of one establishment or more under common ownership or control.

<sup>3</sup>Includes establishments with payroll at any time during year.

<sup>4</sup>Effective with the 1982 Economic Censuses, uniform instructions for reporting inventories were introduced for all sector reports. Up to 1982, respondents were permitted to value inventories using any generally accepted accounting method (FIFO, LIFO, market, to name a few). In 1982, LIFO users were asked to first report inventory values prior to the LIFO adjustment and then to report the LIFO reserve and the LIFO value after adjustment for the reserve.

Because of this change in reporting instructions, the 1982 data for inventories and value added by manufacture included in the tables of this report are not comparable to the prior-year data shown above and in historical census of manufactures and annual survey of manufactures publications. Inventories and value added data estimated on a basis comparable to the historical data, using the reported information for 1982, are shown below:

Industries	End-of-1981 inventories (million dollars)	End-of-1982 inventories (million dollars)	1982 value added by manufacture (million dollars)
Industry 3721, Aircraft .....	15 508.6	19 004.5	15 663.8
Industry 3724, Aircraft engines and engine parts .....	4 155.4	4 218.6	7 521.5
Industry 3728, Aircraft equipment, n.e.c. ....	3 559.9	3 712.6	6 326.9
Industry 3761, Guided missiles and space vehicles .....	1 117.5	1 683.6	7 031.3
Industry 3764, Space propulsion units and parts .....	220.1	270.1	1 533.4
Industry 3769, Space vehicle equipment, n.e.c. ....	136.9	120.3	1 298.0

See Inventories in appendixes for explanation of the difference between end-of-1981 inventory figure shown in table and corresponding figure shown in footnote.

<sup>5</sup>Industry was defined or redefined for 1972 Census of Manufactures, so data are available only for years shown.

**Table 1b. Selected Operating Ratios for the Industry: 1982 and Earlier Years**

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year	Payroll per employee (dollars)	Production workers as percent of total employment (percent)	Annual hours of production workers (number)	Average hourly earnings of production workers (dollars)	Cost of materials as percent of value of shipments (percent)	Cost of materials and payroll as percent of value of shipments (percent)	Value added per employee (dollars)	Payroll as percent of value added (percent)	Value added per production worker hour (dollars)
<b>INDUSTRY 3721, AIRCRAFT</b>									
1982 Census .....	28 141	50	1 965	12.91	56	84	57 071	49	57.64
1981 ASM .....	26 419	52	1 994	11.59	52	79	51 441	51	49.64
1980 ASM .....	23 719	55	2 000	10.14	55	80	51 945	46	47.10
1979 ASM .....	20 934	56	2 012	9.05	55	80	44 526	47	39.23
1978 ASM .....	20 009	57	1 987	8.38	51	79	38 370	52	34.07
1977 Census .....	17 853	53	1 955	7.59	45	72	36 525	49	34.96
1976 ASM .....	17 072	56	1 979	7.10	45	72	32 694	52	29.65
1975 ASM .....	15 639	56	2 002	6.37	47	75	31 904	49	28.66
1974 ASM .....	13 818	58	1 950	5.84	44	73	29 209	47	25.99
1973 ASM .....	12 828	58	1 931	5.47	44	73	27 821	46	24.97
1972 Census .....	12 369	57	1 978	5.14	46	79	21 928	56	19.62
1971 ASM .....	11 516	54	1 970	4.86	44	71	21 257	54	20.03
1970 ASM .....	10 821	53	1 966	4.76	46	76	18 147	60	17.38
1969 ASM .....	10 275	56	1 966	4.22	46	79	16 894	61	15.25
1968 ASM .....	9 349	59	2 043	3.84	50	80	15 682	60	13.05
1967 Census .....	9 227	60	2 124	3.69	51	83	14 084	66	11.12
<b>INDUSTRY 3724, AIRCRAFT ENGINES AND ENGINE PARTS</b>									
1982 Census .....	27 129	59	2 012	11.82	45	71	57 971	47	49.22
1981 ASM .....	25 449	59	1 981	11.50	50	76	49 221	52	41.97
1980 ASM .....	22 891	61	2 042	9.89	48	74	49 486	46	39.94
1979 ASM .....	20 947	60	2 100	8.89	45	74	44 446	47	35.10
1978 ASM .....	19 926	60	2 095	8.18	47	77	38 366	52	30.45
1977 Census .....	18 279	59	2 063	7.54	44	75	33 922	54	27.97
1976 ASM .....	16 410	57	2 025	6.83	44	73	31 482	52	27.09
1975 ASM .....	15 097	57	2 105	6.25	46	76	27 683	55	22.95
1974 ASM .....	13 833	59	2 099	5.62	43	76	25 589	54	20.81
1973 ASM .....	12 767	59	2 068	5.19	43	76	22 853	56	18.72
1972 Census .....	12 002	58	2 070	4.83	48	82	19 023	63	15.93

See footnotes at end of table.

**Table 1b. Selected Operating Ratios for the Industry: 1982 and Earlier Years—Con.**

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year	Payroll per employee (dollars)	Production workers as percent of total employment (percent)	Annual hours of production workers (number)	Average hourly earnings of production workers (dollars)	Cost of materials as percent of value of shipments (percent)	Cost of materials and payroll as percent of value of shipments (percent)	Value added per employee (dollars)	Payroll as percent of value added (percent)	Value added per production worker hour (dollars)
<b>INDUSTRY 3728, AIRCRAFT EQUIPMENT, N.E.C.</b>									
1982 Census.....	25 833	55	1 999	11.27	39	73	46 611	55	42.18
1981 ASM.....	23 185	60	2 061	10.03	39	76	40 741	57	32.95
1980 ASM.....	21 457	60	2 037	9.30	44	80	38 154	56	31.36
1979 ASM.....	19 203	61	2 013	8.28	42	78	34 478	56	28.03
1978 ASM.....	18 299	58	1 970	7.87	40	77	32 125	57	27.99
1977 Census.....	16 718	58	1 937	7.28	37	73	29 396	57	26.37
1976 ASM.....	14 725	64	1 981	6.82	34	68	27 854	53	22.00
1975 ASM.....	13 898	65	2 077	6.21	37	72	25 369	55	18.85
1974 ASM.....	12 920	67	2 100	5.66	39	75	23 480	55	16.66
1973 ASM.....	11 945	67	2 052	5.20	38	75	20 878	57	15.27
1972 Census.....	11 332	67	2 048	4.86	35	73	20 048	57	14.69
<b>INDUSTRY 3761, GUIDED MISSILES AND SPACE VEHICLES</b>									
1982 Census.....	31 721	36	1 964	12.99	36	67	70 537	45	99.65
1981 ASM.....	28 939	32	1 935	12.16	32	67	57 208	51	93.16
1980 ASM.....	27 141	34	2 052	10.66	33	68	54 675	50	77.54
1979 ASM.....	24 725	38	1 952	10.15	32	68	48 241	51	64.94
1978 ASM.....	22 625	36	1 961	9.52	31	67	44 527	51	63.76
1977 Census.....	20 548	37	1 903	9.01	32	68	37 923	54	53.21
1976 ASM.....	19 709	37	1 959	8.34	34	72	36 588	54	51.13
1975 ASM.....	18 204	37	1 935	8.11	36	72	33 283	55	46.04
1974 ASM.....	16 610	38	1 977	6.94	37	74	28 458	58	38.24
1973 ASM.....	15 686	38	1 917	6.75	32	71	27 076	58	37.15
1972 Census.....	14 795	40	1 922	6.29	28	71	24 905	59	32.23
1971 ASM.....	13 387	39	1 873	5.91	27	71	21 757	62	30.05
1970 ASM.....	12 774	35	1 920	5.57	26	72	19 982	64	29.66
1969 ASM.....	11 934	33	1 971	5.25	25	71	19 575	61	30.24
1968 ASM.....	10 959	35	2 039	4.59	28	74	16 988	65	23.86
1967 Census.....	10 421	35	2 036	4.11	28	73	16 578	63	23.36
<b>INDUSTRY 3764, SPACE PROPULSION UNITS AND PARTS</b>									
1982 Census.....	29 134	43	2 167	11.24	33	66	60 632	48	65.56
1981 ASM.....	26 210	40	2 150	10.40	33	69	50 142	52	58.21
1980 ASM.....	23 816	42	2 093	9.75	33	69	45 102	53	50.89
1979 ASM.....	22 225	43	2 135	8.25	32	71	38 581	58	41.78
1978 ASM.....	20 602	42	2 083	8.01	31	68	38 020	54	43.67
1977 Census.....	19 172	38	2 099	7.48	33	71	33 371	57	41.66
1976 ASM.....	17 589	37	2 141	6.85	32	70	30 668	57	38.34
1975 ASM.....	16 341	39	2 101	6.37	36	73	28 273	58	34.92
1974 ASM.....	14 986	40	2 012	5.79	35	71	27 990	54	34.37
1973 ASM.....	14 022	39	2 092	5.45	34	67	27 000	52	33.38
1972 Census.....	13 279	39	2 136	5.06	31	69	24 356	55	29.28
<b>INDUSTRY 3769, SPACE VEHICLE EQUIPMENT, N.E.C.</b>									
1982 Census.....	27 318	61	2 015	11.62	33	63	60 612	45	49.51
1981 ASM.....	24 419	52	2 366	10.20	35	64	55 453	44	45.12
1980 ASM.....	23 057	51	2 023	8.91	34	72	40 379	57	39.47
1979 ASM.....	19 853	56	2 000	7.42	32	74	32 600	61	29.27
1978 ASM.....	19 915	51	2 024	7.47	39	83	27 524	72	26.55
1977 Census.....	19 333	54	2 128	6.66	32	73	32 819	59	28.47
1976 ASM.....	17 909	41	2 104	6.42	28	67	33 842	53	39.60
1975 ASM.....	16 706	43	2 057	6.46	28	69	30 460	55	34.48
1974 ASM.....	14 752	45	2 108	5.69	32	73	24 248	61	25.65
1973 ASM.....	13 797	38	2 053	5.46	35	72	24 728	56	32.02
1972 Census.....	13 842	38	2 139	4.93	36	73	24 589	56	30.41

Note: For qualifications of data, see footnotes on table 1a.



**Table 2. Industry Statistics for Selected States: 1982 and 1977**

[Excludes data for auxiliaries. Includes data for States with 150 employees or more. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and geographic area	1982											1977		
	E <sup>1</sup>	All establishments <sup>2</sup>		All employees		Production workers			Value added by manufacture <sup>4</sup> (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	All employees <sup>3</sup> (1,000)	Value added by manufacture (million dollars)
		Total (no.)	With 20 employees or more (no.)	Number <sup>3</sup> (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						
<b>INDUSTRY 3721, AIRCRAFT</b>														
United States .....	-	166	87	275.4	7 750.1	138.8	272.7	3 521.7	15 717.4	15 716.6	28 047.4	840.3	222.7	8 134.1
Alabama .....	E1	3	3	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Arizona .....	-	4	1	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Arkansas .....	-	2	2	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
California .....	-	41	23	71.6	2 235.2	34.3	65.8	919.1	4 663.0	2 789.2	7 042.7	342.9	59.6	2 525.6
Connecticut .....	-	4	2	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
Florida .....	-	15	5	3.9	71.7	2.7	5.3	46.6	129.9	111.6	232.2	11.6	FF	(D)
Georgia .....	-	6	4	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
Kansas .....	-	9	7	31.3	787.3	17.5	35.0	416.5	1 612.1	1 228.9	2 782.8	102.7	21.3	562.7
Maryland .....	-	2	2	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Missouri .....	-	3	2	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
Nevada .....	-	3	1	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
New Jersey .....	-	2	2	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
New York .....	-	4	2	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
Ohio .....	-	3	1	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Oklahoma .....	-	3	1	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Pennsylvania .....	-	4	3	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
Texas .....	-	20	13	29.1	803.3	15.5	33.3	417.4	1 739.1	1 630.1	3 384.8	42.1	30.1	1 190.1
Washington .....	-	7	4	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
<b>INDUSTRY 3724, AIRCRAFT ENGINES AND ENGINE PARTS</b>														
United States .....	-	338	223	130.5	3 540.3	76.4	153.7	1 816.3	7 565.2	6 258.9	13 799.1	440.5	106.1	3 599.1
Alabama .....	-	1	1	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Arizona .....	-	10	7	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
California .....	-	53	25	4.2	100.5	2.9	6.0	63.4	231.1	161.7	389.2	15.2	3.5	117.6
Connecticut .....	-	56	41	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
Florida .....	-	31	18	8.7	252.3	2.7	5.3	60.3	545.3	202.2	739.7	21.4	FF	(D)
Georgia .....	-	6	2	.2	3.3	.2	.3	2.1	6.6	3.7	10.3	.2	(NA)	(NA)
Illinois .....	E2	7	6	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Indiana .....	-	19	16	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
Iowa .....	-	2	1	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Kentucky .....	-	1	1	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Maine .....	-	1	1	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Massachusetts .....	-	19	15	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
Michigan .....	E1	20	17	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Missouri .....	-	1	1	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
New Hampshire .....	-	3	3	.9	17.6	.6	1.3	1.2	32.0	22.8	54.2	1.1	BB	(D)
New Jersey .....	-	11	7	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
New Mexico .....	-	2	1	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
New York .....	-	17	11	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
North Carolina .....	-	2	2	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Ohio .....	-	17	14	18.4	537.1	8.6	17.9	195.7	1 328.9	869.6	2 160.5	51.5	16.3	623.0
Oklahoma .....	-	8	6	.9	16.5	.6	1.2	11.0	31.6	17.6	53.3	(D)	BB	(D)
Oregon .....	-	1	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Pennsylvania .....	-	11	11	3.8	91.3	2.7	5.2	60.2	197.7	132.7	325.5	24.9	FF	(D)
South Carolina .....	-	1	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Texas .....	-	14	6	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.5	9.0
Vermont .....	-	3	3	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Washington .....	E2	8	2	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Wisconsin .....	-	1	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
<b>INDUSTRY 3728, AIRCRAFT EQUIPMENT, N.E.C.</b>														
United States .....	-	966	420	133.3	3 443.6	73.7	147.3	1 660.5	6 213.3	3 994.7	10 221.9	400.7	102.0	2 998.4
Arizona .....	-	22	7	2.1	53.2	1.8	3.5	41.6	164.4	132.5	258.4	(D)	.2	5.1
Arkansas .....	-	5	2	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
California .....	-	311	128	36.8	931.1	22.5	45.8	510.2	1 645.7	865.4	2 514.7	92.5	30.8	868.0
Colorado .....	-	10	5	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Connecticut .....	-	53	17	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	7.6	221.3
Florida .....	-	39	19	2.8	50.5	2.0	4.0	32.5	113.7	56.0	159.9	11.0	1.8	42.9
Georgia .....	-	5	5	1.6	29.3	1.3	2.3	18.6	50.9	29.2	76.2	17.4	.3	3.8
Illinois .....	-	13	4	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	4.0	135.6
Indiana .....	-	13	6	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Kansas .....	E1	52	22	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
Maryland .....	-	4	4	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Massachusetts .....	E1	9	5	.3	5.8	.2	.4	4.0	13.4	3.7	16.7	1.1	(NA)	(NA)
Michigan .....	-	34	14	1.9	47.9	1.2	2.4	26.3	94.2	95.5	195.3	7.4	2.0	52.5
Minnesota .....	-	10	4	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Missouri .....	E1	19	11	1.1	22.1	.8	1.6	13.2	41.3	17.0	57.7	2.9	.5	9.3
New Hampshire .....	-	3	2	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
New Jersey .....	-	20	11	2.7	64.4	1.4	2.9	32.4	109.7	51.6	172.2	8.4	EE	(D)
New York .....	-	68	33	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
North Carolina .....	-	2	2	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
North Dakota .....	-	1	1	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Ohio .....	-	51	33	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
Oklahoma .....	-	11	4	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
Oregon .....	-	9	5	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Pennsylvania .....	E2	16	10	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.9	25.2
Tennessee .....	-	5	2	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Texas .....	-	62	22	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	2.1	53.5
Utah .....	-	8	3	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Washington .....	-	68	24	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
West Virginia .....	-	1	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)

See footnotes at end of table.

**Table 2. Industry Statistics for Selected States: 1982 and 1977—Con.**

[Excludes data for auxiliaries. Includes data for States with 150 employees or more. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and geographic area		1982											1977	
		All establishments <sup>2</sup>		All employees		Production workers			Value added by manufacture <sup>4</sup> (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	All employees <sup>3</sup> (1,000)	Value added by manufacture (million dollars)
		Total (no.)	With 20 employees or more (no.)	Number <sup>3</sup> (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						
		E <sup>1</sup>												
<b>INDUSTRY 3761, GUIDED MISSILES AND SPACE VEHICLES</b>														
United States .....	-	29	28	99.6	3 159.4	35.9	70.5	915.7	7 025.5	3 652.1	10 218.6	293.3	94.0	3 564.8
Alabama .....	-	2	2	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Arizona .....	-	1	1	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
California .....	-	16	15	73.5	2 387.6	27.0	52.9	710.1	5 252.0	2 787.5	7 644.8	193.1	68.3	2 574.5
Florida .....	-	4	4	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	7.4	269.9
Georgia .....	-	1	1	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Missouri .....	-	1	1	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
New Mexico .....	-	1	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Ohio .....	-	1	1	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Pennsylvania .....	-	1	1	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
<b>INDUSTRY 3764, SPACE PROPULSION UNITS AND PARTS</b>														
United States .....	-	27	25	25.3	737.1	10.8	23.4	263.1	1 534.0	737.2	2 221.2	95.8	18.6	620.7
Alabama .....	-	2	2	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Arizona .....	-	1	1	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
California .....	-	8	8	10.0	312.6	3.6	7.7	93.5	628.7	318.3	955.9	40.7	7.6	283.3
Florida .....	-	2	2	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Maryland .....	-	1	1	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Michigan .....	-	2	2	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
New York .....	-	1	1	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Ohio .....	-	1	1	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Texas .....	-	1	1	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Utah .....	-	2	2	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
Virginia .....	-	1	1	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Washington .....	-	1	1	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
<b>INDUSTRY 3769, SPACE VEHICLE EQUIPMENT, N.E.C.</b>														
United States .....	-	49	33	21.4	584.6	13.0	26.2	304.5	1 297.1	645.1	1 958.3	72.4	7.2	236.3
Arizona .....	E1	5	3	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Arkansas .....	E9	1	1	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
California .....	-	21	12	1.4	33.8	.9	2.0	18.1	63.1	34.6	105.1	7.8	.8	26.8
Colorado .....	-	2	2	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Indiana .....	-	2	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Louisiana .....	-	1	1	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
Maine .....	-	1	1	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Missouri .....	-	1	1	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Pennsylvania .....	-	1	1	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)

Note: For qualifications of data, see footnotes on table 1a.

<sup>1</sup>Payroll and sales data for some small single-unit companies with up to 20 employees (cutoff varied by industry) were obtained from administrative records of other government agencies rather than from census report forms. These data were then used in conjunction with industry averages to estimate the items shown for these small establishments. This technique was also used for a small number of other establishments whose reports were not received at time data were tabulated. The following symbols are shown for those States where estimated data based on administrative records data account for 10 percent or more of figures shown: E1—10 to 19 percent; E2—20 to 29 percent; E3—30 to 39 percent; E4—40 to 49 percent; E5—50 to 59 percent; E6—60 to 69 percent; E7—70 to 79 percent; E8—80 to 89 percent; E9—90 percent or more.

<sup>2</sup>Includes establishments with payroll at any time during year.

<sup>3</sup>Statistics for some producing States have been withheld to avoid disclosing data for individual companies. However, for States with 150 employees or more, number of establishments is shown and employment size range is indicated by one of the following symbols: AA—150 to 249 employees; BB—250 to 499 employees; CC—500 to 999 employees; EE—1,000 to 2,499 employees; FF—2,500 employees or more.

<sup>4</sup>Beginning in 1982, all respondents were requested to report their inventories at cost or market prior to adjustment to LIFO cost. This is a change from prior years in which respondents were permitted to value their inventories using any generally accepted accounting method. Consequently, data for inventories and value added by manufacture are not comparable to prior-year data.



**Table 3a. Summary Statistics for the Industry: 1982**

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Aircraft (SIC 3721)	Aircraft engines and engine parts (SIC 3724)	Aircraft equipment, n.e.c. (SIC 3728)	Guided missiles and space vehicles (SIC 3761)	Space propulsion units and parts (SIC 3764)	Space vehicle equipment, n.e.c. (SIC 3769)
Companies <sup>1</sup> ..... number..	137	279	910	16	20	45
All establishments <sup>2</sup> ..... do..	166	338	966	29	27	49
With 1 to 19 employees..... do..	79	115	546	1	2	16
With 20 to 99 employees..... do..	27	105	268	1	6	16
With 100 employees or more..... do..	60	118	152	27	19	17
All employees:						
Average for year..... 1,000..	275.4	130.5	133.3	99.6	25.3	21.4
Annual payroll <sup>3</sup> ..... mil. dol..	7 750.1	3 540.3	3 443.6	3 159.4	737.1	584.6
Production workers:						
Average for year..... 1,000..	138.8	76.4	73.7	35.9	10.8	13.0
March..... do..	149.3	79.4	74.9	34.9	10.5	13.1
May..... do..	142.2	76.5	73.9	35.7	10.7	12.8
August..... do..	135.4	74.8	72.6	36.1	11.0	13.0
November..... do..	128.4	74.7	73.6	36.9	10.9	13.2
Hours..... millions..						
January to March..... do..	272.7	153.7	147.3	70.5	23.4	26.2
April to June..... do..	75.1	39.3	36.7	16.8	5.7	6.6
July to September..... do..	69.2	38.8	37.0	18.1	5.7	6.2
October to December..... do..	65.8	36.6	35.8	17.9	6.2	6.7
..... do..	62.6	39.0	37.7	17.8	5.8	6.7
Wages..... mil. dol..	3 521.7	1 816.3	1 660.5	915.7	263.1	304.5
Value added by manufacture <sup>4</sup> ..... do..	15 717.4	7 565.2	6 213.3	7 025.5	1 534.0	1 297.1
Cost of materials, etc. <sup>5</sup> ..... do..	15 716.6	6 258.9	3 994.7	3 652.1	737.2	645.1
Materials, parts, containers, etc., consumed..... do..	14 315.3	5 059.9	3 399.6	2 533.4	645.4	566.7
Resales..... do..	547.0	362.6	49.6	(D)	(D)	(D)
Fuels consumed <sup>6</sup> ..... do..	72.1	70.6	40.0	9.2	14.0	5.0
Purchased electric energy <sup>7</sup> ..... do..	181.4	123.7	104.0	73.5	24.4	12.8
Contract work..... do..	600.8	642.0	401.5	(D)	(D)	(D)
Value of shipments, including resales..... do..	28 047.4	13 799.1	10 221.9	10 218.6	2 221.2	1 958.3
Value of resales..... do..	643.7	428.5	62.9	(D)	(D)	(D)
Manufacturers' inventories (see tables 3b and 3c)						
Capital expenditures for plant and equipment <sup>8</sup> ..... do..	855.6	508.0	429.4	314.3	99.0	73.7
New capital expenditures..... do..	840.3	440.5	400.7	293.3	95.8	72.4
New buildings and other structures..... do..	237.5	81.7	71.7	77.9	26.5	21.4
New machinery and equipment..... do..	602.8	358.9	329.0	215.3	69.2	51.0
Used capital expenditures..... do..	15.4	67.6	28.8	21.1	3.3	1.3
Primary product specialization ratio <sup>9</sup> ..... percent..	87	85	71	83	89	62
Coverage ratio <sup>10</sup> ..... do..	97	96	65	86	89	46

<sup>1</sup>For the census, a company is defined as a business organization consisting of one establishment or more under common ownership or control.

<sup>2</sup>Includes establishments with payroll at any time during year.

<sup>3</sup>Data on supplemental labor costs are not included in annual payroll, but are shown in table 3d.

<sup>4</sup>Value added by manufacture is computed using inventory data reported on a cost or market basis prior to any adjustment to LIFO cost. See table 3b, footnote 1 for further explanation.

<sup>5</sup>Data on purchased services for the repair of buildings and machinery and for communication services are not included in cost of materials, etc., but are shown in table 3d.

<sup>6</sup>Data on purchased fuels by type were not collected for 1982. See MC82-S-4, Fuels and Electric Energy Consumed, for 1981 data on purchased fuels by type.

<sup>7</sup>Data on quantity of electric energy used for heat and power are included in table 3d.

<sup>8</sup>Data on capital expenditures for new machinery and equipment by type, depreciable assets, retirements, rental payments, and depreciation are included in table 3d.

<sup>9</sup>Represents ratio of primary product shipments to total product shipments (primary and secondary, excluding miscellaneous receipts) for establishments classified in industry.

<sup>10</sup>Represents ratio of primary products shipped by establishments classified in industry to total shipments of such products by all manufacturing establishments, wherever classified.

**Table 3b. Value of Inventories for the Industry: End of 1981 and 1982**

[Million dollars. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Aircraft (SIC 3721)		Aircraft engines and engine parts (SIC 3724)		Aircraft equipment, n.e.c. (SIC 3728)		Guided missiles and space vehicles (SIC 3761)		Space propulsion units and parts (SIC 3764)		Space vehicle equipment, n.e.c. (SIC 3769)	
	End of 1981	End of 1982	End of 1981	End of 1982	End of 1981	End of 1982	End of 1981	End of 1982	End of 1981	End of 1982	End of 1981	End of 1982
<b>Total inventories<sup>1</sup>.....</b>	<b>15 769.7</b>	<b>19 327.8</b>	<b>4 588.7</b>	<b>4 690.1</b>	<b>3 607.8</b>	<b>3 814.4</b>	<b>1 184.9</b>	<b>1 685.3</b>	<b>225.4</b>	<b>276.0</b>	<b>138.0</b>	<b>120.4</b>
Detail by method of valuation:												
Subject to LIFO costing <sup>2</sup> .....	883.5	1 501.7	978.3	1 121.0	208.5	219.4	28.3	6.4	24.8	48.6	4.2	3.2
LIFO reserve.....	283.9	353.9	447.9	491.6	62.7	67.6	7.4	1.6	5.4	6.0	1.9	1.7
LIFO value.....	599.6	1 147.7	530.4	629.5	145.8	151.8	20.9	4.8	19.4	42.7	2.3	1.5
Not subject to LIFO costing.....	14 787.7	17 736.0	3 508.4	3 466.0	3 218.9	3 221.4	1 156.6	1 678.8	200.6	227.3	128.9	114.5
Valuation method not reported <sup>3</sup> .....	98.5	90.0	101.8	102.7	179.9	373.0	-	-	(Z)	.1	5.0	2.7
Amount subject to LIFO reported without associated reserve and value <sup>4</sup> .....	-	-	.2	.3	.5	.7	-	-	-	-	-	-
Detail by stage of fabrication:												
Finished goods.....	942.5	1 038.2	1 261.7	1 409.4	257.6	303.4	(Z)	(Z)	41.5	34.7	4.0	12.8
Work in process.....	11 825.3	15 116.1	2 402.2	2 279.6	2 839.5	2 780.2	990.3	1 449.3	162.6	219.5	120.7	95.9
Materials and supplies.....	3 002.0	3 173.4	924.8	1 001.1	510.7	730.8	194.6	236.0	21.3	21.8	13.3	11.8

<sup>1</sup>Effective with the 1982 Economic Censuses, uniform instructions for reporting inventories were introduced for all sector reports. Prior to 1982, respondents were permitted to value inventories using any generally accepted accounting method (LIFO, FIFO, market, to name a few). In 1982, all respondents were requested to report inventories at cost or market. LIFO users were asked to first report inventory values prior to the LIFO adjustment and then to report the LIFO reserve and the LIFO value after adjustment for the reserve. For further explanation, see inventories in appendixes.

<sup>2</sup>Only includes data reported by respondents who (a) indicated amount of inventories subject to LIFO cost, and (b) provided sufficient information to determine associated LIFO reserve and value figures.

<sup>3</sup>Includes data estimated for nonresponse and nonmail administrative records and data reported by respondents who provided total inventory figures without other information.

<sup>4</sup>Includes data reported by respondents who indicated their inventories were subject to LIFO cost, but did not provide associated LIFO reserve and value figures.

**Table 3c. Inventories by Specific Method of Valuation for the Industry: End of 1982**

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Aircraft (SIC 3721)		Aircraft engines and engine parts (SIC 3724)		Aircraft equipment, n.e.c. (SIC 3728)		Guided missiles and space vehicles (SIC 3761)		Space propulsion units and parts (SIC 3764)		Space vehicle equip- ment, n.e.c. (SIC 3769)	
	Percent of total	Absolute standard error (percent)	Percent of total	Absolute standard error (percent)	Percent of total	Absolute standard error (percent)	Percent of total	Absolute standard error (percent)	Percent of total	Absolute standard error (percent)	Percent of total	Absolute standard error (percent)
<b>Total Inventories</b> .....	<b>100.0</b>	<b>(X)</b>	<b>100.0</b>	<b>(X)</b>	<b>100.0</b>	<b>(X)</b>	<b>100.0</b>	<b>(X)</b>	<b>100.0</b>	<b>(X)</b>	<b>100.0</b>	<b>(X)</b>
Last-In, First-Out (LIFO) methods .....	7.8	(X)	23.9	(X)	5.8	(X)	.4	(X)	17.6	(X)	2.7	(X)
Non-LIFO methods .....	91.8	(X)	73.9	(X)	84.5	(X)	99.6	(X)	82.4	(X)	95.1	(X)
Cost basis:												
First-In, First-Out (FIFO) .....	.5	(Z)	4.2	1.0	14.3	.9	3.0	(Z)	1.7	(Z)	17.6	1.1
Average cost .....	25.2	(Z)	23.4	.4	21.3	2.9	50.3	(Z)	12.1	(Z)	26.3	.7
Specific or actual cost .....	32.8	(Z)	10.3	.3	10.3	.5	31.2	(Z)	48.6	.1	46.4	2.9
Standard cost .....	4.5	(Z)	35.9	.6	6.2	.3	(Z)	(Z)	20.0	.1	(S)	(S)
Other .....	28.8	(Z)	.1	(Z)	32.3	1.5	15.1	(Z)	(Z)	(Z)	(Z)	(Z)
Market basis:												
Market lower than cost .....	(Z)	(Z)	(Z)	(Z)	(Z)	(Z)	(Z)	(Z)	(Z)	(Z)	(Z)	(Z)
Market always used .....	(Z)	(Z)	(Z)	(Z)	(Z)	(Z)	(Z)	(Z)	(Z)	(Z)	(Z)	(Z)
Valuation method not reported .....	.5	(X)	2.2	(X)	9.8	(X)	(Z)	(X)	(Z)	(X)	2.3	(X)
Amount subject to LIFO reported without associated reserve and value .....	(Z)	(X)	(Z)	(X)	(Z)	(X)	(Z)	(X)	(Z)	(X)	(Z)	(X)

Note: The percentages shown for the LIFO and non-LIFO totals and the categories "valuation method not reported" and "amount subject to LIFO reported..." are based on the census universe estimates included in table 3b. The percentages shown for the specific non-LIFO methods of valuation (e.g., FIFO, etc.) are based on a representative sample of establishments included in the annual survey of manufactures (ASM) panel for 1982 (see appendixes for description of ASM). The absolute standard error of each of the ASM estimates is shown above.

**Table 3d. Supplemental Industry Statistics Based on Sample Estimates: 1982**

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Aircraft (SIC 3721)		Aircraft engines and engine parts (SIC 3724)		Aircraft equipment, n.e.c. (SIC 3728)		Guided missiles and space vehicles (SIC 3761)		Space propulsion units and parts (SIC 3764)		Space vehicle equip- ment, n.e.c. (SIC 3769)	
	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)
<b>Supplemental labor costs:</b>												
Total .....	2 022.1	1	1 005.4	1	858.1	2	910.1	1	172.2	1	176.8	1
Legal costs .....	606.9	1	280.8	1	272.2	2	215.5	1	50.7	1	50.9	2
Voluntary costs .....	1 415.2	1	724.6	1	585.9	3	694.6	1	121.4	1	125.8	1
<b>Purchased services:</b>												
Cost of purchased services for the repair of—												
Buildings and other structures .....	42.5	1	39.0	1	23.3	6	20.5	1	9.7	1	1.1	21
Response coverage ratio (percent) <sup>2</sup> .....	80.9	(X)	95.8	(X)	87.2	(X)	94.8	(X)	98.7	(X)	34.4	(X)
Machinery .....	69.9	1	215.6	1	41.5	8	26.2	1	5.2	2	2.5	65
Response coverage ratio (percent) <sup>2</sup> .....	81.4	(X)	96.8	(X)	89.1	(X)	95.8	(X)	97.0	(X)	34.8	(X)
Cost of purchased communication services .....	83.4	1	40.8	2	41.3	3	42.1	1	11.5	2	12.6	3
Response coverage ratio (percent) <sup>2</sup> .....	84.6	(X)	97.1	(X)	87.8	(X)	95.9	(X)	98.7	(X)	78.9	(X)
<b>Electric energy used for heat and power:</b>												
Purchased:												
Quantity (million kWh) .....	3 588.2	1	2 283.0	1	2 068.5	1	1 074.4	1	420.8	1	270.6	9
Cost .....	181.4	(X)	123.7	(X)	104.0	(X)	73.5	(X)	24.4	(X)	12.8	(X)
Generated less sold (million kWh) .....	(S)	1	(S)	1	(S)	1	(S)	1	(S)	1	-	-
<b>Gross book value of depreciable assets:</b>												
Total:												
Beginning of year .....	5 402.5	1	3 700.0	2	2 622.4	2	1 435.7	1	537.8	2	356.4	8
New capital expenditures .....	830.3	1	411.1	4	350.4	4	292.6	1	95.7	1	61.7	2
Used capital expenditures .....	15.1	3	62.9	1	25.6	11	20.5	1	3.3	5	1.3	13
Retirements .....	121.6	4	112.2	4	77.0	6	87.3	1	12.0	1	23.7	1
End of year .....	6 126.3	1	4 061.8	2	2 921.5	2	1 661.5	1	624.9	2	395.7	7
<b>Buildings and other structures:</b>												
Beginning of year .....	2 003.1	2	896.8	2	818.4	2	464.7	1	203.2	2	118.5	9
New capital expenditures .....	236.3	1	71.3	2	63.1	10	77.9	1	26.6	1	14.0	1
Used capital expenditures .....	3.0	11	15.8	2	10.4	9	17.5	1	.5	1	.7	1
Retirements .....	7.4	7	13.7	2	16.3	10	14.1	1	3.1	1	6.0	1
End of year .....	2 234.9	1	970.3	2	875.6	2	545.9	1	227.2	2	127.2	9
<b>Machinery and equipment:</b>												
Beginning of year .....	3 399.4	1	2 803.2	2	1 804.1	2	971.0	1	334.6	2	237.8	8
New capital expenditures .....	594.0	1	339.8	4	287.3	3	214.7	1	69.2	1	47.7	2
Automobiles, trucks, etc., for highway use .....	12.3	1	11.2	8	4.8	25	3.6	1	.6	1	.1	1
Computers and peripheral data processing equipment .....	58.9	1	28.7	2	15.7	3	53.8	1	5.3	1	4.3	1
All other .....	498.2	1	282.7	4	256.9	2	152.7	1	61.3	1	42.9	5
New machinery and equipment, n.s.k. <sup>3</sup> .....	24.6	(S)	17.2	(S)	9.9	(S)	4.6	(S)	1.9	(S)	.3	(S)
Used capital expenditures .....	12.1	1	47.0	1	15.2	13	3.0	1	2.8	5	17.7	26
Retirements .....	114.1	3	98.5	4	60.7	6	73.2	1	8.8	1	26.5	1
End of year .....	3 891.4	1	3 091.6	2	2 045.8	2	1 115.5	1	397.7	2	168.5	7
<b>Rental payments:</b>												
Total .....	164.9	1	109.5	2	103.0	6	59.8	1	21.8	2	23.6	2
Buildings and other structures .....	60.9	1	19.7	11	32.1	4	38.5	1	5.5	2	9.9	3
Machinery and equipment .....	104.0	1	89.8	2	70.9	7	21.3	1	16.3	2	13.7	2
<b>Depreciation charges during 1982:</b>												
Total .....	443.0	1	311.7	4	213.6	3	139.7	1	43.5	1	25.6	6
Buildings and other structures .....	85.1	1	37.1	3	37.8	3	31.7	1	9.3	2	5.4	8
Machinery and equipment .....	358.0	1	274.6	4	175.8	3	108.0	1	34.2	1	20.2	6

See footnotes at end of table.



Table 3d. Supplemental Industry Statistics Based on Sample Estimates: 1982—Con.

Note: Data for total new capital expenditures, new building expenditures, new machinery expenditures, and total used expenditures are also shown in table 3a. Data in table 3a are census universe totals and may differ from annual survey of manufactures (ASM) sample estimates shown in this table. Data in this table represent best estimates of year-to-year change as measured by the continuing ASM sample. However, they are subject to sampling error and, hence, as estimates of level, are not as reliable as universe figures shown in table 3a.

<sup>1</sup>For description of relative standard error of estimate, see Qualifications of the Data in appendixes.

<sup>2</sup>Measure of extent to which respondents reported each item. Derived for each item by calculating the ratio of weighted employment for those sample establishments that reported the specific inquiry to weighted total employment for all sample establishments classified in industry. (See appendixes for explanation of sample weight.)

<sup>3</sup>Represents total machinery and equipment expenditures for establishments that did not break down their expenditures by specific type.

Table 4. Industry Statistics by Employment Size of Establishment: 1982

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and employment size class	E <sup>1</sup>	All estab- lish- ments (no.)	All employees		Production workers			Value added by manufac- ture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expend- itures (million dollars)	End-of- year invent- ories (million dollars)
			Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)					
INDUSTRY 3721, AIRCRAFT												
Total.....	-	166	275.4	7 750.1	138.8	272.7	3 521.7	15 717.4	15 716.6	28 047.4	840.3	19 327.8
Establishments with an average of—												
1 to 4 employees.....	E8	49	.2	2.4	.1	.2	1.5	6.0	4.5	10.2	.2	4.3
5 to 9 employees.....	-	16	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
10 to 19 employees.....	E8	14	.2	2.9	.1	.2	1.5	6.1	5.5	11.5	.4	4.3
20 to 49 employees.....	E2	17	.6	8.2	.4	.8	5.2	17.3	16.4	32.4	.5	9.9
50 to 99 employees.....	E4	10	.8	12.6	.4	.8	6.5	26.7	24.7	50.3	.7	19.2
100 to 249 employees.....	E5	10	1.6	40.8	1.0	1.9	21.7	63.3	71.0	133.4	2.6	65.6
250 to 499 employees.....	E1	7	2.5	52.8	1.6	3.4	27.8	95.2	153.8	230.7	8.5	193.6
500 to 999 employees.....	-	10	7.9	180.8	5.1	9.6	102.7	312.8	327.8	634.6	11.3	247.7
1,000 to 2,499 employees.....	-	11	19.6	457.5	12.2	23.8	282.8	704.6	771.0	1 507.3	32.0	654.9
2,500 employees or more.....	-	22	242.0	6 992.1	117.8	232.0	3 072.1	14 485.3	14 342.0	25 436.9	784.2	18 128.3
INDUSTRY 3724, AIRCRAFT ENGINES AND ENGINE PARTS												
Total.....	-	338	130.5	3 540.3	76.4	153.7	1 816.3	7 565.2	6 258.9	13 799.1	440.5	4 690.1
Establishments with an average of—												
1 to 4 employees.....	E9	44	.1	1.6	.1	.1	.9	4.3	3.7	7.9	.2	2.5
5 to 9 employees.....	E8	27	.2	3.5	.1	.2	2.0	6.8	5.1	11.6	.5	3.9
10 to 19 employees.....	E6	44	.6	11.0	.4	.8	6.5	22.4	18.5	40.2	1.7	12.1
20 to 49 employees.....	E2	62	2.0	44.9	1.5	3.1	27.2	98.3	59.0	157.2	7.3	38.9
50 to 99 employees.....	E1	43	3.1	69.4	2.2	4.7	45.6	149.9	83.6	231.4	9.4	57.1
100 to 249 employees.....	E1	60	9.6	204.0	6.8	14.2	131.0	442.7	296.2	737.3	31.0	178.9
250 to 499 employees.....	-	26	8.7	209.9	5.9	12.2	129.5	430.2	376.1	785.2	44.7	237.4
500 to 999 employees.....	-	10	6.9	159.7	4.5	9.1	95.6	319.8	233.8	564.9	29.0	152.4
1,000 to 2,499 employees.....	-	12	17.9	468.5	12.6	24.9	301.6	866.6	705.0	1 551.0	63.2	679.5
2,500 employees or more.....	-	10	81.5	2 367.7	42.2	84.3	1 076.4	5 224.3	4 477.7	9 712.2	253.4	3 327.4
Covered by administrative records <sup>2</sup> .....	E9	78	.7	11.5	.4	.9	6.2	24.4	19.7	43.2	1.6	15.4
INDUSTRY 3728, AIRCRAFT EQUIPMENT, N.E.C.												
Total.....	-	966	133.3	3 443.6	73.7	147.3	1 660.5	6 213.3	3 994.7	10 221.9	400.7	3 814.4
Establishments with an average of—												
1 to 4 employees.....	E9	224	.5	7.6	.3	.6	4.5	16.9	10.1	26.6	1.1	9.9
5 to 9 employees.....	E7	160	1.1	18.9	.7	1.4	10.3	35.8	21.0	55.6	2.5	19.6
10 to 19 employees.....	E5	162	2.2	42.7	1.5	2.9	24.2	79.7	45.1	123.5	4.7	38.6
20 to 49 employees.....	E3	179	5.7	105.0	3.9	7.8	61.6	201.9	112.5	308.7	16.3	75.3
50 to 99 employees.....	E2	89	6.3	133.5	4.2	8.5	75.2	252.2	129.6	383.0	21.9	98.7
100 to 249 employees.....	E1	72	10.6	216.3	7.0	13.7	124.2	444.0	230.2	672.6	27.7	190.2
250 to 499 employees.....	-	37	13.0	295.9	8.2	16.0	167.5	612.5	267.6	865.4	45.9	300.4
500 to 999 employees.....	-	22	15.6	371.1	10.0	18.7	216.7	740.8	438.7	1 184.5	41.1	366.6
1,000 to 2,499 employees.....	-	10	13.5	354.6	8.8	17.6	208.1	704.8	422.5	1 064.9	67.9	388.0
2,500 employees or more.....	-	11	64.8	1 898.1	29.2	60.2	768.2	3 124.5	2 317.5	5 537.0	171.6	2 327.2
Covered by administrative records <sup>2</sup> .....	E9	386	2.8	44.5	1.7	3.4	23.2	83.4	47.5	128.5	5.8	50.1
INDUSTRY 3761, GUIDED MISSILES AND SPACE VEHICLES												
Total.....	-	29	99.6	3 159.4	35.9	70.5	915.7	7 025.5	3 652.1	10 218.6	293.3	1 685.3
Establishments with an average of—												
10 to 19 employees.....	-	1	.9	24.8	.3	.6	6.1	27.9	10.1	38.4	1.2	3.7
20 to 49 employees.....	-	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
100 to 249 employees.....	-	5	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
250 to 499 employees.....	-	2	2.2	55.4	1.2	2.2	25.2	138.9	46.0	167.5	3.8	43.6
500 to 999 employees.....	-	2	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
1,000 to 2,499 employees.....	-	6	9.5	280.9	3.9	8.2	98.3	483.7	196.1	705.3	18.7	36.3
2,500 employees or more.....	-	12	87.1	2 798.4	30.6	59.6	786.1	6 375.0	3 399.9	9 307.4	269.6	1 601.6
INDUSTRY 3764, SPACE PROPULSION UNITS AND PARTS												
Total.....	-	27	25.3	737.1	10.8	23.4	263.1	1 534.0	737.2	2 221.2	95.8	276.0
Establishments with an average of—												
1 to 4 employees.....	E9	1	.2	7.5	.1	.3	2.8	14.4	3.5	18.2	.2	2.4
10 to 19 employees.....	-	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
20 to 49 employees.....	-	5	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
50 to 99 employees.....	-	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
250 to 499 employees.....	-	6	2.2	55.6	1.2	2.4	24.8	97.3	63.5	162.6	5.9	20.6
500 to 999 employees.....	-	5	3.8	103.9	2.7	5.5	64.3	201.4	117.3	294.7	11.9	53.2
1,000 to 2,499 employees.....	-	5	7.2	219.6	2.5	5.2	61.2	467.9	248.5	685.0	41.7	138.5
2,500 employees or more.....	-	3	11.9	350.6	4.3	10.0	110.0	752.9	304.4	1 060.6	36.0	61.2

See footnotes at end of table.

**Table 4. Industry Statistics by Employment Size of Establishment: 1982—Con.**

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and employment size class	E <sup>1</sup>	All establishments (no.)	All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	End-of-year inventories (million dollars)
			Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)					
<b>INDUSTRY 3769, SPACE VEHICLE EQUIPMENT, N.E.C.</b>												
Total.....	-	49	21.4	584.6	13.0	26.2	304.5	1 297.1	645.1	1 958.3	72.4	120.4
Establishments with an average of—												
1 to 4 employees.....	E9	6	(Z)	.7	(Z)	(Z)	.4	1.7	.9	2.6	(Z)	.2
5 to 9 employees.....	-	3	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
10 to 19 employees.....	E6	7	.1	1.6	.1	.1	1.1	3.1	1.3	4.3	(Z)	.4
20 to 49 employees.....	E2	10	.3	6.5	.2	.4	3.7	14.6	6.7	22.1	2.5	2.6
50 to 99 employees.....	E2	6	.4	9.3	.3	.6	5.6	14.6	6.7	21.3	1.9	2.8
100 to 249 employees.....	E1	8	1.3	27.0	.9	2.0	15.7	57.5	40.5	102.5	7.8	16.5
250 to 499 employees.....	-	3	19.2	539.6	11.5	23.0	278.1	1 205.8	588.9	1 805.5	60.2	98.0
500 to 999 employees.....	-	3	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
2,500 employees or more.....	-	3	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records <sup>2</sup> .....	E9	14	.1	2.5	.1	.1	1.3	4.4	2.3	6.7	(Z)	.4

Note: For qualifications of data, see footnotes on table 1a. Data shown as a (D) are included in underscored figures above.

<sup>1</sup>Payroll and sales data for some small single-unit companies with up to 20 employees (cutoff varied by industry) were obtained from administrative records of other government agencies rather than from census report forms. These data were then used in conjunction with industry averages to estimate the items shown for these small establishments. This technique was also used for a small number of other establishments whose reports were not received at time data were tabulated. The following symbols are shown for those States where estimated data based on administrative records data account for 10 percent or more of figures shown: E1—10 to 19 percent; E2—20 to 29 percent; E3—30 to 39 percent; E4—40 to 49 percent; E5—50 to 59 percent; E6—60 to 69 percent; E7—70 to 79 percent; E8—80 to 89 percent; E9—90 percent or more.

<sup>2</sup>Report forms were not mailed to small single-unit companies with up to 20 employees (cutoff varied by industry). Payroll and sales data for 1982 were obtained from administrative records supplied by other agencies of the Federal Government. Those data were then used in conjunction with industry averages to estimate the items shown. Data are also included in respective size classes shown.

**Table 5a. Industry Statistics by Industry and Primary Product Class Specialization: 1982**

[Table presents selected statistics for establishments according to their degree of specialization in products primary to their industry. Measures of plant specialization shown are (1) industry specialization: ratio of primary product shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment; and (2) product class specialization: ratio of largest primary product class shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment. See appendix for method of computing ratios. Statistics for establishments with specialization ratios of less than 75 percent are included in total lines but are not shown as a separate class. In addition, data may not be shown for various reasons; e.g., to avoid disclosing operations of individual companies. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes.]

Industry or product class code	Industry or product class by percent of specialization	All establishments (number)	All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)
			Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)				
3721	Aircraft:										
	Entire industry .....	166	275.4	7 750.1	138.8	272.7	3 521.7	15 717.4	15 716.6	28 047.4	840.3
	Establishments with 75 percent specialization or more ..	153	234.7	6 417.0	118.2	231.0	2 971.0	13 415.0	14 055.3	24 247.3	684.2
37211	Military aircraft:										
	Establishments with this product class primary .....	26	118.6	3 662.2	56.6	115.9	1 488.2	8 534.9	5 508.1	12 548.3	463.5
	Establishments with 75 percent specialization or more in class .....	17	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
37215	Civilian aircraft:										
	Establishments with this product class primary .....	36	98.1	2 469.6	49.2	92.7	1 220.2	4 133.4	7 856.9	10 528.6	238.3
	Establishments with 75 percent specialization or more in class .....	29	68.5	1 675.4	35.7	65.8	839.5	2 252.7	6 306.5	7 367.2	179.9
37217	Modification, conversion, and overhaul of aircraft:										
	Establishments with this product class primary .....	31	35.8	960.6	21.2	40.0	508.4	1 905.5	1 353.7	3 161.8	89.2
	Establishments with 75 percent specialization or more in class .....	21	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
37218	Aeronautical services on aircraft, n.e.c.:										
	Establishments with this product class primary .....	17	22.5	648.1	11.4	23.5	300.0	1 122.5	975.8	1 765.7	48.6
	Establishments with 75 percent specialization or more in class .....	13	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
3724	Aircraft engines and engine parts:										
	Entire industry .....	338	130.5	3 540.3	76.4	153.7	1 816.3	7 565.2	6 258.9	13 799.1	440.5
	Establishments with 75 percent specialization or more ..	292	93.9	2 503.7	53.3	107.0	1 173.3	5 757.7	4 752.9	10 342.8	328.0
37241	Aircraft engines for military aircraft:										
	Establishments with this product class primary .....	9	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
	Establishments with 75 percent specialization or more in class .....	2	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
37242	Aircraft engines for civilian aircraft:										
	Establishments with this product class primary .....	7	26.8	779.9	13.7	29.1	365.3	1 748.3	1 352.7	3 177.3	65.1
	Establishments with 75 percent specialization or more in class .....	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
37243	Aeronautical services on aircraft engines:										
	Establishments with this product class primary .....	22	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
	Establishments with 75 percent specialization or more in class .....	17	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
37244	Aircraft engine parts and accessories:										
	Establishments with this product class primary .....	192	53.8	1 381.8	36.9	74.0	864.0	2 594.8	1 933.0	4 536.4	192.9
	Establishments with 75 percent specialization or more in class .....	150	29.5	698.9	21.3	43.1	452.5	1 415.2	1 035.2	2 430.4	94.8
3728	Aircraft equipment, n.e.c.:										
	Entire industry .....	966	133.3	3 443.6	73.7	147.3	1 660.5	6 213.3	3 994.7	10 221.9	400.7
	Establishments with 75 percent specialization or more ..	873	72.8	1 742.1	46.8	94.0	1 005.1	3 140.7	1 932.3	5 203.2	242.2
37281	Aircraft parts and accessories, n.e.c.:										
	Establishments with this product class primary .....	390	123.2	3 242.6	67.7	135.5	1 556.5	5 844.5	3 792.5	9 657.3	373.7
	Establishments with 75 percent specialization or more in class .....	312	64.7	1 593.9	41.6	83.6	922.1	2 861.8	1 769.4	4 765.5	222.9

See footnotes at end of table.



Table 5a. **Industry Statistics by Industry and Primary Product Class Specialization: 1982—**

Con.

[Table presents selected statistics for establishments according to their degree of specialization in products primary to their industry. Measures of plant specialization shown are (1) industry specialization: ratio of primary product shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment; and (2) product class specialization: ratio of largest primary product class shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment. See appendix for method of computing ratios. Statistics for establishments with specialization ratios of less than 75 percent are included in total lines but are not shown as a separate class. In addition, data may not be shown for various reasons; e.g., to avoid disclosing operations of individual companies. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes.]

Industry or product class code	Industry or product class by percent of specialization	All establishments (number)	All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)
			Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)				
37282	Aircraft propellers and helicopter rotors: Establishments with this product class primary ----- Establishments with 75 percent specialization or more in class -----	9 9	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)
37283	Research and development on aircraft parts: Establishments with this product class primary ----- Establishments with 75 percent specialization or more in class -----	12 7	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)
3761	<b>Guided missiles and space vehicles:</b> Entire industry ----- Establishments with 75 percent specialization or more ..	29 21	99.6 72.4	3 159.4 2 386.0	35.9 24.5	70.5 47.9	915.7 649.7	7 025.5 5 310.4	3 652.1 2 786.4	10 218.6 7 787.5	293.3 204.2
37611	Complete missiles: Establishments with this product class primary ----- Establishments with 75 percent specialization or more in class -----	10 2	30.7 (D)	925.7 (D)	13.2 (D)	25.6 (D)	313.1 (D)	2 293.8 (D)	1 221.9 (D)	3 149.4 (D)	70.0 (D)
37612	Complete space vehicles and booster stages: Establishments with this product class primary ----- Establishments with 75 percent specialization or more in class -----	4 1	22.7 (D)	718.4 (D)	8.3 (D)	16.1 (D)	220.1 (D)	1 138.7 (D)	1 389.5 (D)	2 526.3 (D)	67.6 (D)
37613	Research and development on complete missiles: Establishments with this product class primary ----- Establishments with 75 percent specialization or more in class -----	5 3	14.3 (D)	436.0 (D)	5.9 (D)	11.0 (D)	144.5 (D)	1 383.1 (D)	234.4 (D)	1 492.3 (D)	(D) (D)
37614	Research and development on complete space vehicles: Establishments with this product class primary ----- Establishments with 75 percent specialization or more in class -----	2 -	(D) -	(D) -	(D) -	(D) -	(D) -	(D) -	(D) -	(D) -	(D) -
37615	Other services on complete missiles and space vehicles: Establishments with this product class primary ----- Establishments with 75 percent specialization or more in class -----	7 6	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)
3764	<b>Space propulsion units and parts:</b> Entire industry ----- Establishments with 75 percent specialization or more ..	27 20	25.3 21.6	737.1 627.5	10.8 9.3	23.4 20.5	263.1 229.8	1 534.0 1 305.8	737.2 669.2	2 221.2 1 916.9	95.8 86.2
37645	Missile or space vehicle propulsion units: Establishments with this product class primary ----- Establishments with 75 percent specialization or more in class -----	11 2	14.9 (D)	426.6 (D)	5.7 (D)	12.4 (D)	132.6 (D)	916.1 (D)	387.6 (D)	1 259.3 (D)	60.9 (D)
37646	Research and development on propulsion units: Establishments with this product class primary ----- Establishments with 75 percent specialization or more in class -----	3 -	(D) -	(D) -	(D) -	(D) -	(D) -	(D) -	(D) -	(D) -	(D) -
37647	Other services on propulsion units: Establishments with this product class primary ----- Establishments with 75 percent specialization or more in class -----	3 2	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)
37648	Propulsion unit parts and accessories: Establishments with this product class primary ----- Establishments with 75 percent specialization or more in class -----	7 3	2.4 (D)	62.1 (D)	1.9 (D)	3.9 (D)	45.2 (D)	106.4 (D)	37.3 (D)	141.7 (D)	3.2 (D)
3769	<b>Space vehicle equipment, n.e.c.:</b> Entire industry ----- Establishments with 75 percent specialization or more ..	49 37	21.4 10.7	584.6 295.8	13.0 6.4	26.2 13.0	304.5 138.2	1 297.1 541.4	645.1 259.0	1 958.3 800.7	72.4 26.4
37692	Missile and space vehicle parts, n.e.c.: Establishments with this product class primary ----- Establishments with 75 percent specialization or more in class -----	25 16	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)
37694	Research and development on missile and space vehicle parts, n.e.c.: Establishments with this product class primary ----- Establishments with 75 percent specialization or more in class -----	8 5	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)

Note: For qualifications of data, see footnotes on table 1a.

**Table 5b. Industry-Product Analysis—Value of Shipments and Primary Product Shipments, Specialization and Coverage Ratios for the Industry: 1982 and Earlier Census Years**

[An establishment is assigned to an industry based on shipment values of products representing largest amount considered primary to an industry. Frequently, establishment shipments comprise mixtures of products assigned to an industry (primary), those considered primary to other industries (secondary), and receipts for activities such as merchandising or contract work. Columns A-D show this product pattern for an industry, and column E shows primary product specialization ratio. The extent to which an industry's primary products are shipped by establishments classified in and out of an industry is shown in columns F-H and coverage ratio is shown in column I. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and product group code	Industry and census year	Value of shipments					Value of primary product shipments			
		Total (million dollars)	Primary products (million dollars)	Secondary products (million dollars)	Miscellaneous receipts (million dollars)	Primary product specialization ratio Col. B ÷ Col. B + C (percent)	Total made in all industries (million dollars)	Made in this industry (million dollars)	Made in other industries (million dollars)	Coverage ratio Col. B ÷ Col. F (percent)
		A	B	C	D	E	F	G	H	I
3721	Aircraft ----- 1982..	28 047.4	23 609.8	3 634.3	803.3	87	24 235.1	23 609.8	625.3	97
	1977..	14 834.2	11 759.4	2 403.1	671.7	83	12 052.8	11 759.4	293.3	98
	1972..	8 779.3	7 236.6	1 162.4	380.3	86	7 538.2	7 236.6	301.6	96
3724	Aircraft engines and engine parts ----- 1982..	13 799.1	11 183.4	1 999.4	616.3	85	11 640.8	11 183.4	457.5	96
	1977..	6 272.3	4 756.6	1 115.0	400.7	81	4 994.6	4 756.6	238.0	95
	1972..	3 640.2	2 891.1	417.4	331.7	87	3 069.7	2 891.1	178.6	94
3728	Aircraft equipment, n.e.c. ----- 1982..	10 221.9	7 023.7	2 924.3	273.9	71	10 789.1	7 023.7	3 765.4	65
	1977..	4 758.0	3 281.7	1 271.8	204.5	72	5 761.5	3 281.7	2 479.8	57
	1972..	3 031.9	2 256.6	664.5	110.8	77	3 436.9	2 256.6	1 180.3	66
3761	Guided missiles and space vehicles ----- 1982..	10 218.6	7 415.8	1 481.7	1 321.1	83	8 585.6	7 415.8	1 169.8	86
	1977..	5 314.4	4 427.3	681.1	206.0	87	4 848.2	4 427.3	420.9	91
	1972..	4 123.6	3 505.1	417.1	201.4	89	3 705.3	3 505.1	200.2	95
3764	Space propulsion units and parts ----- 1982..	2 221.2	1 957.8	241.3	22.1	89	2 199.1	1 957.8	241.3	89
	1977..	886.9	815.3	68.2	3.4	92	930.1	815.3	114.8	88
	1972..	716.3	645.7	63.6	7.0	91	740.3	645.7	94.6	87
3769	Space vehicle equipment, n.e.c. ----- 1982..	1 958.3	1 193.5	736.9	27.9	62	2 573.9	1 193.5	1 380.4	46
	1977..	339.4	(D)	(D)	(D)	85	882.4	(D)	(D)	(D)
	1972..	788.2	(D)	(D)	(D)	79	825.4	(D)	(D)	(D)

<sup>1</sup>Minimum percentage; exact percentage withheld to avoid disclosing data for individual companies.

<sup>2</sup>Relationships are not meaningful because of predominance of miscellaneous receipts, particularly receipts for contract and commission work on materials owned by others.

**Table 5c-1. Industry-Product Analysis—Shipments by Product Class and Industry: 1982**

[Million dollars. Table shows where products of an industry (referred to as primary and listed in table 6a) are made and what products are made by establishments classified in an industry. Read down an industry column to find what products are produced in an industry. Only those product groups that have at least \$2 million in shipments from establishments classified in one of industries included in this chapter are shown. Read across to determine where products of industries in this chapter are produced. To extent that some of primary products are made in industries not included in this chapter, value of such shipments is shown in "Other industries" column. Specified "Other industries" are listed in table 5c-2 if they account for more than \$5 million of products primary to this chapter. For meaning of abbreviations and symbols, see explanatory text. For explanation of terms, see appendixes]

1982 product code	Product group, product class, and miscellaneous receipts	All industries	Aircraft (SIC 3721)	Aircraft engines and engine parts (SIC 3724)	Aircraft equipment, n.e.c. (SIC 3728)	Guided missiles and space vehicles (SIC 3761)	Space propulsion units and parts (SIC 3764)	Space vehicle equipment, n.e.c. (SIC 3769)	Other industries
	<b>Total</b> -----	(X)	28 047.4	13 799.1	10 221.9	10 218.6	2 221.2	1 958.3	(X)
	<b>Primary products</b> -----	(X)	23 609.8	11 183.4	7 023.7	7 415.8	1 957.8	1 193.5	(X)
	<b>Secondary products</b> -----	(X)	3 634.3	1 999.4	2 924.3	1 481.7	241.3	736.9	(X)
	<b>Miscellaneous receipts</b> -----	(X)	803.3	616.3	273.9	1 321.1	22.1	27.9	(X)
3721-	<b>Aircraft</b> -----	24 235.1	23 609.8	(D)	566.3	(D)	(D)	(D)	(D)
37211	Military aircraft -----	9 834.5	9 558.6	(D)	(D)	(D)	(D)	(D)	(D)
37215	Civilian aircraft -----	8 769.4	(D)	(D)	(D)	(D)	(D)	(D)	(D)
37217	Modification, conversion, and overhaul of aircraft -----	2 783.4	2 591.4	(D)	(D)	(D)	(D)	(D)	(D)
37218	Aeronautical services on aircraft, n.e.c. -----	2 817.1	(D)	(D)	133.9	(D)	(D)	(D)	(D)
37210	Complete aircraft, n.s.k. -----	30.7	30.3	(D)	(D)	(D)	(D)	(D)	(D)
3724-	<b>Aircraft engines and engine parts</b> -----	11 640.8	(D)	11 183.4	(D)	(D)	(D)	(D)	153.0
37241	Aircraft engines for military aircraft -----	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
37242	Aircraft engines for civilian aircraft -----	2 142.6	(D)	(D)	(D)	(D)	(D)	(D)	(D)
37243	Aeronautical services on aircraft engines -----	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
37244	Aircraft engine parts and accessories -----	5 725.5	(D)	5 316.9	(D)	(D)	(D)	(D)	(D)
37240	Aircraft engine and engine parts, n.s.k. -----	79.4	(D)	78.9	(D)	(D)	(D)	(D)	.3
3728-	<b>Aircraft equipment, n.e.c.</b> -----	10 789.1	3 306.6	98.4	7 023.7	(D)	26.8	(D)	233.1
37281	Aircraft parts and accessories, n.e.c. -----	9 862.4	(D)	71.8	6 356.5	(D)	(D)	9.6	222.3
37282	Aircraft propellers and helicopter rotors -----	191.0	(D)	17.7	170.0	(D)	(D)	(D)	(D)
37283	Research and development on aircraft parts -----	432.2	(D)	8.7	198.7	(D)	(D)	(D)	(D)
37280	Aircraft equipment, n.e.c., n.s.k. -----	303.5	(D)	.2	298.6	(D)	(D)	(D)	(D)
3761-	<b>Guided missiles and space vehicles</b> -----	8 585.6	(D)	(D)	(D)	7 415.8	(D)	(D)	47.3
37611	Complete missiles -----	2 644.8	(D)	(D)	(D)	2 083.7	(D)	(D)	(D)
37612	Complete space vehicles and booster stages -----	2 010.7	(D)	(D)	(D)	1 947.7	(D)	(D)	(D)
37613	Research and development on complete missiles -----	1 504.0	(D)	(D)	(D)	1 355.1	(D)	(D)	(D)
37614	Research and development on complete space vehicles -----	987.2	(D)	(D)	(D)	981.9	(D)	(D)	(D)
37615	Other services on complete missiles and space vehicles -----	1 438.3	(D)	(D)	(D)	1 046.9	(D)	(D)	(D)
37610	Guided missiles and space vehicles, n.s.k. -----	.5	(D)	(D)	(D)	(D)	(D)	(D)	(D)
3764-	<b>Space propulsion units and parts</b> -----	2 199.1	15.7	49.7	49.3	(D)	1 957.8	(D)	(D)
37645	Missile or space vehicle propulsion units -----	960.7	(D)	(D)	(D)	(D)	909.4	(D)	(D)
37646	Research and development on propulsion units -----	694.8	(D)	(D)	(D)	(D)	679.3	(D)	(D)
37647	Other services on propulsion units -----	238.0	(D)	(D)	(D)	(D)	195.9	(D)	(D)
37648	Propulsion unit parts and accessories -----	301.5	(D)	31.4	47.3	(D)	169.0	(D)	(D)
37640	Space propulsion units and parts, n.s.k. -----	4.2	(D)	(D)	(D)	(D)	4.2	(D)	(D)

See footnotes at end of table.



**Table 5c-1. Industry-Product Analysis—Shipments by Product Class and Industry: 1982—Con.**

[Million dollars. Table shows where products of an industry (referred to as primary and listed in table 6a) are made and what products are made by establishments classified in an industry. Read down an industry column to find what products are produced in an industry. Only those product groups that have at least \$2 million in shipments from establishments classified in one of industries included in this chapter are shown. Read across to determine where products of industries in this chapter are produced. To extent that some of primary products are made in industries not included in this chapter, value of such shipments is shown in "Other industries" column. Specified "Other industries" are listed in table 5c-2 if they account for more than \$5 million of products primary to this chapter. For meaning of abbreviations and symbols, see explanatory text. For explanation of terms, see appendixes]

1982 product code	Product group, product class, and miscellaneous receipts	All industries	Aircraft (SIC 3721)	Aircraft engines and engine parts (SIC 3724)	Aircraft equipment, n.e.c. (SIC 3728)	Guided missiles and space vehicles (SIC 3761)	Space propulsion units and parts (SIC 3764)	Space vehicle equipment, n.e.c. (SIC 3769)	Other industries
3769-	Space vehicle equipment, n.e.c. ....	2 573.9	89.8	12.3	636.2	484.9	(D)	1 193.5	(D)
37692	Missile and space vehicle parts, n.e.c. ....	1 161.0	(D)	(D)	(D)	261.9	(D)	(D)	(D)
37694	Research and development on missile and space vehicle parts, n.e.c. ....	1 403.3	(D)	(D)	(D)	223.0	(D)	829.0	(D)
37690	Space vehicle equipment, n.e.c., n.s.k. ....	9.6	-	-	-	-	-	(D)	(D)
<b>OTHER SHIPMENTS BY FOUR-DIGIT PRODUCT GROUP</b>									
2399-	Fabricated textile products, n.e.c. ....	(X)	-	-	-	-	(D)	-	(X)
2731-	Book publishing ....	(X)	-	-	-	(D)	-	-	(X)
3069-	Fabricated rubber products, n.e.c. ....	(X)	-	-	(D)	-	-	-	(X)
3079-	Miscellaneous plastics products ....	(X)	-	(D)	(D)	-	-	-	(X)
3423-	Hand and edge tools, n.e.c. ....	(X)	-	-	(D)	-	-	4.5	(X)
3433-	Heating equipment, except electric ....	(X)	-	-	-	(D)	-	-	(X)
3441-	Fabricated structural metal ....	(X)	-	(D)	-	(D)	-	(D)	(X)
3443-	Fabricated plate work (boiler shops) ....	(X)	-	(D)	13.7	(D)	-	(D)	(X)
3483-	Ammunition, except for small arms, n.e.c. ....	(X)	(D)	(D)	(D)	(D)	(D)	(D)	(X)
3489-	Ordnance and accessories, n.e.c. ....	(X)	(D)	(D)	34.2	-	(D)	-	(X)
3494-	Valves and pipe fittings ....	(X)	-	10.4	23.1	-	(D)	(D)	(X)
3499-	Fabricated metal products, n.e.c. ....	(X)	-	-	(D)	-	-	-	(X)
3511-	Turbines and turbine generator sets ....	(X)	-	576.7	4.3	-	-	-	(X)
3519-	Internal combustion engines, n.e.c. ....	(X)	-	(D)	-	-	-	-	(X)
3523-	Farm machinery and equipment ....	(X)	-	(D)	(D)	-	-	-	(X)
3534-	Elevators and moving stairways ....	(X)	-	-	-	-	-	(D)	(X)
3536-	Hoists, cranes, and monorails ....	(X)	-	-	-	-	-	(D)	(X)
3537-	Industrial trucks and tractors ....	(X)	-	-	(D)	-	-	-	(X)
3541-	Machine tools, metal cutting types ....	(X)	-	(D)	(D)	-	-	-	(X)
3542-	Machine tools, metal forming types ....	(X)	-	-	(D)	-	-	-	(X)
3544-	Special dies, tools, jigs, and fixtures ....	(X)	-	4.8	(D)	-	-	-	(X)
3547-	Rolling mill machinery ....	(X)	-	-	(D)	-	-	-	(X)
3551-	Food products machinery ....	(X)	-	-	-	-	(D)	-	(X)
3559-	Special industry machinery, n.e.c. ....	(X)	-	(D)	11.5	(D)	-	-	(X)
3561-	Pumps and pumping equipment ....	(X)	-	(D)	-	-	8.3	(D)	(X)
3569-	General industrial machinery, n.e.c. ....	(X)	-	(D)	(D)	-	-	-	(X)
3573-	Electronic computing equipment ....	(X)	-	(D)	9.1	-	-	(D)	(X)
3599-	Machinery, except electrical, n.e.c. ....	(X)	-	4.7	15.4	-	-	(D)	(X)
3613-	Switchgear and switchboard apparatus ....	(X)	(D)	-	-	-	-	(D)	(X)
3621-	Motors and generators ....	(X)	-	-	(D)	-	-	(D)	(X)
3624-	Carbon and graphite products ....	(X)	-	-	-	-	(D)	-	(X)
3643-	Current-carrying wiring devices ....	(X)	-	-	(D)	-	-	-	(X)
3662-	Radio and TV communication equipment ....	(X)	67.3	(D)	110.4	579.7	(D)	(D)	(X)
3679-	Electronic components, n.e.c. ....	(X)	-	(D)	(D)	(D)	-	-	(X)
3694-	Engine electrical equipment ....	(X)	-	(D)	-	-	-	-	(X)
3711-	Motor vehicles and car bodies ....	(X)	-	(D)	-	-	-	-	(X)
3714-	Motor vehicle parts and accessories ....	(X)	-	(D)	-	-	-	-	(X)
3731-	Ship building and repairing ....	(X)	(D)	-	(D)	-	(D)	-	(X)
3743-	Railroad equipment ....	(X)	-	(D)	(D)	-	-	-	(X)
3795-	Tanks and tank components ....	(X)	-	(D)	12.7	-	(D)	(D)	(X)
3799-	Transportation equipment, n.e.c. ....	(X)	-	(D)	-	-	-	-	(X)
3811-	Engineering and scientific instruments ....	(X)	-	-	-	-	3.0	-	(X)
3823-	Process control instruments ....	(X)	-	-	(D)	-	-	-	(X)
3824-	Fluid meters and counting devices ....	(X)	-	(D)	(D)	-	-	(D)	(X)
3825-	Instruments to measure electricity ....	(X)	(D)	-	(D)	(D)	-	-	(X)
3829-	Measuring and controlling devices, n.e.c. ....	(X)	(D)	-	(D)	(D)	-	-	(X)
3832-	Optical instruments and lenses ....	(X)	-	-	(D)	(D)	-	-	(X)
3861-	Photographic equipment and supplies ....	(X)	-	-	(D)	-	-	-	(X)
3931-	Musical instruments ....	(X)	-	-	(D)	-	-	-	(X)
<b>MISCELLANEOUS RECEIPTS</b>									
93000 00	Receipts for work done for others on their materials ....	(X)	4.5	34.1	56.0	(D)	(D)	(D)	(X)
99980 13	Sales of scrap and refuse ....	(X)	5.4	9.3	(D)	(D)	(D)	.2	(X)
99980 31	Receipts for installation or construction of products of the establishment ....	(X)	.1	(D)	(D)	(D)	-	-	(X)
99980 41	Receipts for research and development work ....	(X)	(D)	(D)	(D)	(D)	(D)	(D)	(X)
99980 61	Receipts for repair work ....	(X)	(D)	(D)	101.5	(D)	(D)	(D)	(X)
99980 98	Other miscellaneous receipts, including receipts for repair work, etc. ....	(X)	96.4	6.1	17.0	17.0	1.0	1.0	(X)
99980 00	Miscellaneous receipts, n.s.k. ....	(X)	(D)	(D)	1.2	(D)	(D)	(D)	(X)
99989 00	Sales of products bought and resold without further manufacture, processing, or assembly at establishment ....	(X)	643.7	428.5	62.9	(D)	(D)	(D)	(X)

**Table 5c-2. Industry—Product Analysis—Other Industries With Shipments of Primary Products: 1982**

[Million dollars. Table is a continuation of table 5c-1 and shows where products of industries in this chapter (referred to as primary products and listed in table 6a) are made. To extent that some of primary products are made in industries not included in this chapter, value of such shipments is shown in "Other industries" column of table 5c-1. Specified "Other industries" are listed in this table if they account for more than \$5 million of products primary to this chapter. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

1982 product code	Other industries	Value	1982 product code	Other industries	Value
<b>3721-</b>	<b>AIRCRAFT</b>		<b>3728-</b>	<b>AIRCRAFT EQUIPMENT, N.E.C.—Con.</b>	
	3585 Refrigeration and heating equipment .....	(D)		3573 Electronic computing equipment .....	(D)
<b>3724-</b>	<b>AIRCRAFT ENGINES AND ENGINE PARTS</b>			3599 Machinery, except electrical, n.e.c. ....	22.8
	3443 Fabricated plate work (boiler shops) .....	(D)		3622 Industrial controls .....	(D)
	3494 Valves and pipe fittings .....	17.5		3662 Radio and TV communication equipment .....	(D)
	3511 Turbines and turbine generator sets .....	(D)		3714 Motor vehicle parts and accessories .....	8.2
	3519 Internal combustion engines, n.e.c. ....	(D)		3743 Railroad equipment .....	(D)
	3561 Pumps and pumping equipment .....	(D)		3842 Surgical appliances and supplies .....	(D)
	3662 Radio and TV communication equipment .....	(D)	<b>3761-</b>	<b>GUIDED MISSILES AND SPACE VEHICLES</b>	
	3714 Motor vehicle parts and accessories .....	23.6		3662 Radio and TV communication equipment .....	(D)
<b>3728-</b>	<b>AIRCRAFT EQUIPMENT, N.E.C.</b>		<b>3764-</b>	<b>SPACE PROPULSION UNITS AND PARTS</b>	
	3079 Miscellaneous plastics products .....	(D)		3662 Radio and TV communication equipment .....	(D)
	3291 Abrasive products .....	(D)	<b>3769-</b>	<b>SPACE VEHICLE EQUIPMENT, N.E.C.</b>	
	3292 Asbestos products .....	(D)		3452 Bolts, nuts, rivets, and washers .....	(D)
	3356 Nonferrous rolling and drawing, n.e.c. ....	(D)		3662 Radio and TV communication equipment .....	(D)
	3489 Ordnance and accessories, n.e.c. ....	(D)		3842 Surgical appliances and supplies .....	(D)
	3494 Valves and pipe fittings .....	9.4			
	3533 Oil field machinery .....	(D)			
	3561 Pumps and pumping equipment .....	(D)			

**Table 6a. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1982 and 1977**

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 product code	Product	1982			1977		
		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>	
			Quantity <sup>2</sup>	Value (million dollars)		Quantity <sup>2</sup>	Value (million dollars)
<b>3721—</b>	<b>AIRCRAFT</b>						
	<b>Total</b> .....	(NA)	(X)	24 235.1	(NA)	(X)	12 052.8
37211 —	Military aircraft (including all aircraft for U.S. military and any other aircraft built to military specifications) .....	(NA)	(X)	9 834.5	(NA)	(X)	4 579.6
37211 21	Fixed wing aircraft, powered, including adjustable wing and foldable wing aircraft .....	12	}	9 834.5	(NA)	(X)	4 579.5
37211 23	Rotary wing aircraft, powered (helicopters, autogiros) .....	10			(NA)	(X)	
37211 28	Giders, balloons, and other aircraft, n.e.c. ....	9			(NA)	(X)	
37211 00	Complete aircraft, military type, n.s.k. ....	(NA)	—	—	(NA)	(X)	.1
37215 —	Civilian aircraft:						
	As reported in the census of manufactures .....	34	(X)	8 769.4	29	(X)	4 706.1
	As reported in Current Industrial Report M37G, New Complete Aircraft and Aircraft Engine Except Military .....	(NA)	(X)	8 681.5	(NA)	(X)	4 700.9
37215 11	Fixed wing, single engine .....	(NA)	1	507	(NA)	(X)	4 700.9
37215 12	Fixed wing, multiengine .....	(NA)		8 073.4	(NA)	(X)	
37215 18	Rotary wing (helicopter, autogiros) .....	(NA)		526	(NA)	(X)	
37215 20	Other aircraft .....	(NA)	(D)	411.7	(D)		
37217 —	Modification, conversion, and overhaul of previously accepted aircraft	(NA)	(X)	2 783.4	(NA)	(X)	747.2
37217 11	For U.S. military aircraft and all other aircraft built to military specifications .....	20	(X)	2 081.3	18	(X)	466.7
37217 51	For civilian customers .....	35	(X)	700.2	27	(X)	280.5
37217 00	Modification, conversion, and overhaul of previously accepted aircraft, n.s.k. ....	(NA)	(X)	1.9	(NA)	(X)	—
37218 —	Other aeronautical services on complete aircraft .....	(NA)	(X)	2 817.1	(NA)	(X)	1 988.2
	For military customers:						
37218 13	Research and development on complete aircraft .....	11	(X)	713.1	11	(X)	776.3
37218 15	All other aeronautical services on complete aircraft .....	15	(X)	1 394.7	13	(X)	952.1
	For civilian customers:						
37218 53	Research and development on complete aircraft .....	7	(X)	90.7	4	(X)	259.8
37218 55	All other aeronautical services on complete aircraft .....	19	(X)	618.6	18		

See footnotes at end of table.



**Table 6a. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1982 and 1977—Con.**

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text.]

1982 product code	Product	1982			1977				
		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>			
			Quantity <sup>2</sup>	Value (million dollars)		Quantity <sup>2</sup>	Value (million dollars)		
	<b>AIRCRAFT—Con.</b>								
37218 —	Other aeronautical services on complete aircraft —Con.								
37218 00	Aeronautical services on complete aircraft, n.e.c., n.s.k.	(NA)	(X)	—	(NA)	(X)	—		
37210 00	Aircraft, n.s.k., typically for establishments with 20 employees or more (see note)	(NA)	(X)	30.7	(NA)	(X)	13.4		
37210 02	Aircraft, n.s.k., typically for establishments with less than 20 employees (see note)	(NA)	(X)	—	(NA)	(X)	18.3		
	<b>AIRCRAFT ENGINES AND ENGINE PARTS</b>								
3724— —	<b>Total</b>	(NA)	(X)	11 640.8	(NA)	(X)	4 994.6		
37241 —	Aircraft engines for military aircraft:								
37241 00	Military engines (for U.S. military aircraft and any other aircraft built to military specifications)	10	(X)	(D)	(NA)	(X)	1 047.9		
37242 —	Aircraft engines for civilian aircraft:								
37242 00	Aircraft engines for civilian aircraft:								
	As reported in the census of manufactures	10	(X)	2 142.6	11	(X)	937.0		
	As reported in Current Industrial Report M37G, New Complete Aircraft and Aircraft Engine Except Military	number	(NA)	11 316	2 127.5	(NA)	(X)	915.8	
37242 11	Reciprocating (piston)	do	}						
37242 12	Turbojet and turboshaft	do							
37242 13	Turboprop and turboprop	do		(NA)	11 316	2 127.5	(NA)	(NA)	915.8
37242 14	Other, including jato bottles and liquid power plants, excluding missile engines	do							
37243 —	Aeronautical services on aircraft engines	(NA)	(X)	(D)	(NA)	(X)	660.8		
	Research and development work on aircraft engines, including work done for affiliates and other establishments of the same company:								
37243 21	For U.S. military aircraft engines and all other engines built to military specification	7	(X)	831.2	12	(X)	457.4		
37243 23	For civilian aircraft engines	5	(X)	25.6	8	(X)	25.8		
37243 31	All other aeronautical services on aircraft engines:								
	For U.S. military aircraft engines and all other engines built to military specification	11	(X)	(D)	8	(X)	48.4		
37243 33	For civilian aircraft engines	21	(X)	(D)	17	(X)	125.9		
37243 00	Aeronautical services on aircraft engines, n.s.k.	(NA)	(X)	—	(NA)	(X)	3.3		
37244 —	Aircraft engine parts and accessories	(NA)	(X)	5 725.5	(NA)	(X)	2 308.5		
37244 13	For U.S. military aircraft engines and all other aircraft engines built to military specifications	131	(X)	2 901.1	105	(X)	905.6		
37244 53	For civilian aircraft engines	158	(X)	2 816.1	132	(X)	1 372.3		
37244 00	Aircraft engine parts and accessories, n.s.k.	(NA)	(X)	8.3	(NA)	(X)	30.6		
37240 00	Aircraft engines and engine parts, n.s.k., typically for establishments with 20 employees or more (see note)	(NA)	(X)	36.2	(NA)	(X)	19.1		
37240 02	Aircraft engines and engine parts, n.s.k., typically for establishments with less than 20 employees	(NA)	(X)	43.2	(NA)	(X)	21.3		
	<b>AIRCRAFT PARTS AND AUXILIARY EQUIPMENT, N.E.C.</b>								
3728— —	<b>Total</b>	(NA)	(X)	10 789.1	(NA)	(X)	5 761.5		
37281 —	Aircraft parts and accessories, n.e.c.	(NA)	(X)	9 862.4	(NA)	(X)	35 436.8		
37281 13	Aircraft mechanical power transmission equipment:								
	For U.S. military aircraft and all other aircraft built to military specifications	16	(X)	342.6	10	(X)	286.1		
37281 15	For civilian aircraft	17	(X)	215.2	11	(X)	83.9		
37281 73	Aircraft hydraulic subassemblies:								
	For U.S. military aircraft and all other aircraft built to military specifications	32	(X)	218.4	39	(X)	150.3		
37281 75	For civilian aircraft	30	(X)	111.8	38	(X)	142.3		
37281 83	Aircraft pneumatic subassemblies:								
	For U.S. military aircraft and all other aircraft built to military specifications	19	(X)	125.2	15	(X)	34.1		
37281 85	For civilian aircraft	17	(X)	163.0	18	(X)	110.3		
37281 94	Aircraft landing gear:								
	For U.S. military aircraft and all other aircraft built to military specifications	23	(X)	193.9	16	(X)	85.0		
37281 95	For civilian aircraft	21	(X)	160.3	17	(X)	144.9		
37281 98	Other aircraft subassemblies and parts (except aircraft propellers and helicopter rotors):								
	For U.S. military aircraft and all other aircraft built to military specifications	190	(X)	3 902.9	125	(X)	32 184.0		
37281 99	For civilian aircraft	263	(X)	4 331.5	178	(X)	32 035.2		
37281 00	Aircraft parts and auxiliary equipment, n.e.c., n.s.k.	(NA)	(X)	97.5	(NA)	(X)	72.1		
37282 —	Aircraft propellers and helicopter rotors	(NA)	(X)	191.0	(NA)	(X)	( <sup>3</sup> )		
37282 10	Complete propellers, excluding helicopter rotors	5	(X)	( <sup>4</sup> )	7	(X)	48.6		
37282 31	Propeller blades	8	(X)	24.7	6	(X)	3.9		
37282 51	Propeller parts, except propeller blades	6	(X)	110.1	8	(X)	55.9		
37282 61	Helicopter rotors and parts	20	(X)	56.1	( <sup>3</sup> )	(NA)	(X)	( <sup>3</sup> )	
37282 00	Aircraft propellers and propeller parts, n.s.k.	(NA)	(X)	—	(NA)	(X)	.3		
37283 —	Research and development on aircraft parts	(NA)	(X)	432.2	(NA)	(X)	161.4		
37283 13	For U.S. military aircraft and all other aircraft built to military specifications	28	(X)	300.0	30	(X)	125.5		
37283 15	For civilian aircraft	26	(X)	132.1	23	(X)	34.9		
37283 00	Research and development on aircraft parts, n.s.k.	(NA)	(X)	.2	(NA)	(X)	1.0		

See footnotes at end of table.

**Table 6a. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1982 and 1977—Con.**

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 product code	Product	1982			1977		
		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>	
			Quantity <sup>2</sup>	Value (million dollars)		Quantity <sup>2</sup>	Value (million dollars)
	<b>AIRCRAFT PARTS AND AUXILIARY EQUIPMENT, N.E.C.—Con.</b>						
37280 00	Aircraft parts and auxiliary equipment, n.e.c., n.s.k., typically for establishments with 20 employees or more (see note) -----	(NA)	(X)	175.0	(NA)	(X)	85.6
37280 02	Aircraft parts and auxiliary equipment, n.e.c., n.s.k., typically for establishments with less than 20 employees (see note) -----	(NA)	(X)	128.5	(NA)	(X)	77.6
	<b>GUIDED MISSILES AND SPACE VEHICLES</b>						
3761- --	<b>Total -----</b>	<b>(NA)</b>	<b>(X)</b>	<b>8 585.6</b>	<b>(NA)</b>	<b>(X)</b>	<b>4 848.2</b>
37611 --	Complete missiles (excluding propulsion systems):						
37611 00	Complete missiles -----	15	(X)	2 644.8	10	(X)	1 685.5
37612 --	Complete space vehicles and booster stages (excluding propulsion systems) -----	(NA)	(X)	2 010.7	(NA)	(X)	822.1
37612 25	For U.S. Government military customers ----- number..	7	(S)	652.9	6	(X)	725.7
37612 35	For U.S. Government nonmilitary customers ----- do..	5	(S)	1 357.9	5	(X)	96.4
37612 45	For other customers ----- do..	2	(S)	1 357.9	5	(X)	96.4
37612 00	Space vehicles and booster stages, complete, excluding propulsion units, n.s.k. -----	(NA)	(X)	-	(NA)	(X)	-
37613 --	Research and development on complete missiles:						
37613 00	Research and development on complete missiles -----	10	(X)	1 504.0	11	(X)	871.5
37614 --	Research and development on complete space vehicles -----	(NA)	(X)	987.2	(NA)	(X)	918.1
37614 13	For U.S. Government military customers -----	6	(X)	664.1	9	(X)	918.1
37614 15	For U.S. Government nonmilitary customers -----	8	(X)	323.1	9	(X)	918.1
37614 17	For other customers -----	-	(X)	-	-	(X)	-
37614 00	Research and development on complete space vehicles, n.s.k. -----	(NA)	(X)	-	(NA)	(X)	-
37615 --	All other services on complete missiles and space vehicles -----	(NA)	(X)	1 438.3	(NA)	(X)	549.9
37615 11	All other services on complete missiles, excluding propulsion -----	10	(X)	403.2	10	(X)	165.2
37615 13	All other services on complete space vehicles:						
37615 15	For U.S. Government military customers -----	10	(X)	666.0	10	(X)	302.5
37615 15	For U.S. Government nonmilitary customers -----	7	(X)	368.9	8	(X)	82.2
37615 23	For other customers -----	6	(X)	368.9	8	(X)	82.2
37615 00	Services, except research and development, on completed missiles and space vehicles, n.s.k. -----	(NA)	(X)	.2	(NA)	(X)	-
37610 00	Guided missiles and space vehicles, n.s.k., typically for establishments with 20 employees or more (see note) -----	(NA)	(X)	.5	(NA)	(X)	1.1
37610 02	Guided missiles and space vehicles, n.s.k., typically for establishments with less than 20 employees (see note) -----	(NA)	(X)	-	(NA)	(X)	-
	<b>SPACE PROPULSION UNITS AND PARTS</b>						
3764- --	<b>Total -----</b>	<b>(NA)</b>	<b>(X)</b>	<b>2 199.1</b>	<b>(NA)</b>	<b>(X)</b>	<b>930.1</b>
37645 --	Complete missile or space vehicle engines and/or propulsion units -----	(NA)	(X)	960.7	(NA)	(X)	370.6
37645 11	For U.S. Government military customers ----- number..	13	(S)	524.5	11	(X)	276.7
37645 13	For U.S. Government nonmilitary customers ----- do..	7	(S)	374.3	9	(X)	93.9
37645 15	For other customers ----- do..	7	(S)	61.8	9	(X)	93.9
37645 00	Missile or space vehicle engines and/or propulsion units, complete, n.s.k. -----	(NA)	(X)	-	(NA)	(X)	-
37646 --	Research and development on complete missile or space vehicle engines and/or propulsion units -----	(NA)	(X)	694.8	(NA)	(X)	345.8
37646 11	For U.S. Government military customers -----	11	(X)	694.8	8	(X)	345.8
37646 13	For U.S. Government nonmilitary customers -----	4	(X)	694.8	4	(X)	345.8
37646 15	For other customers -----	2	(X)	694.8	(NA)	(X)	-
37646 00	Research and development on complete missile or space vehicle engines and/or propulsion units, n.s.k. -----	(NA)	(X)	-	(NA)	(X)	-
37647 --	All other services on complete missile or space vehicle engines and/or propulsion units -----	(NA)	(X)	238.0	(NA)	(X)	105.0
37647 11	For U.S. Government military customers -----	7	(X)	238.0	7	(X)	105.0
37647 13	For U.S. Government nonmilitary customers -----	3	(X)	238.0	4	(X)	105.0
37647 15	For other customers -----	5	(X)	238.0	(NA)	(X)	-
37647 00	Services on complete missile or space vehicle engines and/or propulsion units, n.s.k. -----	(NA)	(X)	-	(NA)	(X)	-
37648 --	Missile and space vehicle engine and/or propulsion unit parts and accessories -----	(NA)	(X)	301.5	(NA)	(X)	105.6
37648 11	For U.S. Government military customers -----	30	(X)	169.9	22	(X)	75.7
37648 13	For U.S. Government nonmilitary customers -----	17	(X)	101.5	18	(X)	26.2
37648 15	For other customers -----	9	(X)	30.0	18	(X)	26.2
37648 00	Missile and space vehicle engine and/or propulsion unit parts and accessories, n.s.k. -----	(NA)	(X)	-	(NA)	(X)	3.7
37640 00	Space propulsion units and parts, n.s.k., typically for establishments with 20 employees or more (see note) -----	(NA)	(X)	4.2	(NA)	(X)	3.1
37640 02	Space propulsion units and parts, n.s.k., typically for establishments with less than 20 employees (see note) -----	(NA)	(X)	-	(NA)	(X)	-

See footnotes at end of table.



**Table 6a. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1982 and 1977—Con.**

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 product code	Product	1982			1977		
		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>	
			Quantity <sup>2</sup>	Value (million dollars)		Quantity <sup>2</sup>	Value (million dollars)
	<b>SPACE VEHICLE EQUIPMENT, N.E.C.</b>						
3769 —	Total .....	(NA)	(X)	2 573.9	(NA)	(X)	882.4
37692 —	Missile and space vehicle components, parts, and subassemblies, n.e.c. ....	(NA)	(X)	1 161.0	(NA)	(X)	420.0
	For U.S. Government military customers:						
37692 11	Airframes <sup>5</sup> .....	17	(X)	141.3	14	(X)	21.8
37692 13	Space capsules <sup>5</sup> .....	7	(X)	109.6	8	(X)	55.3
37692 19	All other .....	42	(X)	528.0	42	(X)	163.9
37692 25	For U.S. Government nonmilitary customers .....	21	(X)	283.9	(NA)	(X)	98.0
37692 35	For other customers <sup>5</sup> .....	16	(X)	84.3	(NA)	(X)	68.7
37692 00	Missile and space vehicle parts and subassemblies, n.s.k. ....	(NA)	(X)	14.0	(NA)	(X)	12.3
37694 —	Research and development on missile and space vehicle parts and components, n.e.c. ....	(NA)	(X)	1 403.3	(NA)	(X)	455.2
	For U.S. Government military customers:						
37694 14	Airframes and space capsules .....	8	(X)	517.6	5	(X)	84.8
37694 19	All other .....	13	(X)	698.7	19	(X)	177.0
37694 25	For U.S. Government nonmilitary customers .....	11	(X)	119.2	7	(X)	148.0
37694 35	For other customers .....	6	(X)	66.1	9	(X)	45.0
37694 00	Research and development on missile and space vehicle parts and component, n.s.k. ....	(NA)	(X)	1.6	(NA)	(X)	.4
37690 00	Space vehicle equipment, n.e.c., n.s.k., typically for establishments with 20 employees or more (see note) .....	(NA)	(X)	2.9	(NA)	(X)	3.7
37690 02	Space vehicle equipment, n.e.c., n.s.k., typically for establishments with less than 20 employees (see note) .....	(NA)	(X)	6.7	(NA)	(X)	3.5

Note: In 1982 Census of Manufactures, data for establishments of small single-unit companies with up to 20 employees were estimated from administrative-record data rather than data actually collected from respondents. Employment cutoff used for administrative records for each industry and shipments figures are included in code ending with "002". In both 1982 and 1977 Censuses of Manufactures, products not completely identified on standard forms were coded in appropriate product class (five-digit) followed by "00" or to appropriate product group code (four-digit) followed by "000".

<sup>1</sup>Data reported by all producers, not just those with shipments of \$100,000 or more.

<sup>2</sup>For some establishments, data have been estimated from central unit values which are based on quantity-value relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: \* 10 to 19 percent estimated; \*\* 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by (S).

<sup>3</sup>For 1977, data for product code 37282 61 were included with product codes 37281 98 and 37281 99. Consequently product class 37281 and 37282 have been combined.

<sup>4</sup>For 1982, product codes 37282 10 and 37282 51 are combined to avoid disclosing data for individual companies.

<sup>5</sup>For 1977, product codes 37692 11, 37692 13, and 37692 25 quantity data were collected, but did not meet Bureau statistical standards and have been suppressed.

**Table 6b. Product Classes—Value of Shipments by All Producers for Specified States: 1982 and 1977**

[Million dollars. Product classes covered are those that are economically significant and whose production is geographically dispersed, provided dispersion is not approximated by data in table 2. Also, product classes are not shown if they are miscellaneous or "not specified by type" classes. Statistics for some States are withheld because they are either less than \$2 million in product class shipments or they disclose data for individual companies in 1982. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Product class and geographic area	1982 value of product shipments	1977 value of product shipments	Product class and geographic area	1982 value of product shipments	1977 value of product shipments
<b>37211, MILITARY AIRCRAFT</b>			<b>37283, RESEARCH AND DEVELOPMENT ON AIRCRAFT PARTS</b>		
United States .....	9 834.5	4 579.5	United States .....	432.2	161.4
California .....	2 588.5	1 424.6	New York .....	13.2	(FF)
<b>37215, CIVILIAN AIRCRAFT</b>			Ohio .....	10.0	(FF)
United States .....	8 769.4	(NA)	<b>37611, COMPLETE MISSILES</b>		
Kansas .....	986.7	(NA)	United States .....	2 644.8	1 685.5
Texas .....	415.5	(NA)	California .....	1 008.0	859.5
<b>37217, MODIFICATION, CONVERSION, AND OVERHAUL OF AIRCRAFT</b>			<b>37612, COMPLETE SPACE VEHICLES AND BOOSTER STAGES</b>		
United States .....	2 783.4	(NA)	United States .....	2 010.7	822.1
California .....	238.3	(NA)	California .....	1 942.0	715.2
Florida .....	53.0	(NA)	<b>37613, RESEARCH AND DEVELOPMENT ON COMPLETE MISSILES</b>		
Texas .....	429.2	(NA)	United States .....	1 504.0	871.5
<b>37218, AERONAUTICAL SERVICES ON AIRCRAFT, N.E.C.</b>			California .....	1 017.9	(GG)
United States .....	2 817.1	(NA)	<b>37614, RESEARCH AND DEVELOPMENT ON COMPLETE SPACE VEHICLES</b>		
California .....	1 033.0	(NA)	United States .....	987.2	918.1
Texas .....	175.2	(NA)	California .....	965.6	(GG)
<b>37242, AIRCRAFT ENGINES FOR CIVILIAN AIRCRAFT</b>			<b>37615, OTHER SERVICES ON COMPLETE MISSILES AND SPACE VEHICLES</b>		
United States .....	2 142.6	937.0	United States .....	1 438.3	549.9
Florida .....	(D)	(D)	California .....	880.1	349.7
<b>37244, AIRCRAFT ENGINE PARTS AND ACCESSORIES</b>			Florida .....	156.3	80.2
United States .....	5 725.5	2 308.5	<b>37645, MISSILE OR SPACE VEHICLE PROPULSION UNITS</b>		
Arizona .....	101.1	16.0	United States .....	960.7	370.6
California .....	343.3	111.6	California .....	437.4	156.2
Connecticut .....	1 814.1	917.4	<b>37647, OTHER SERVICES ON PROPULSION UNITS</b>		
Florida .....	250.9	(NA)	United States .....	238.0	105.0
Illinois .....	103.4	55.5	California .....	23.3	74.1
Indiana .....	560.7	256.6	<b>37648, PROPULSION UNIT PARTS AND ACCESSORIES</b>		
Massachusetts .....	443.1	134.4	United States .....	301.5	105.6
Michigan .....	202.7	65.6	California .....	129.0	63.0
New Jersey .....	81.1	58.7	Ohio .....	8.1	(AA)
New York .....	150.7	100.5	<b>37692, MISSILE AND SPACE VEHICLE PARTS, N.E.C.</b>		
Ohio .....	930.7	333.2	United States .....	1 161.0	420.0
Pennsylvania .....	230.4	102.5	Arizona .....	78.6	25.5
Texas .....	27.7	(BB)	California .....	237.6	106.3
<b>37281, AIRCRAFT PARTS AND ACCESSORIES, N.E.C.</b>			Colorado .....	63.3	(CC)
United States .....	9 862.4	15 436.8	New York .....	36.8	19.8
Alabama .....	11.2	6.1	Ohio .....	10.2	11.6
California .....	2 852.7	1 840.5	Washington .....	17.9	(BB)
Florida .....	141.2	38.6	<b>37694, RESEARCH AND DEVELOPMENT ON MISSILE AND SPACE VEHICLE PARTS, N.E.C.</b>		
Georgia .....	97.4	(FF)	United States .....	1 403.3	455.2
Kansas .....	266.1	254.2	California .....	108.0	47.4
Massachusetts .....	23.4	5.9			
Michigan .....	152.2	74.4			
Minnesota .....	16.1	(BB)			
New Jersey .....	183.9	81.1			
New York .....	468.3	408.0			
Ohio .....	630.8	318.4			
Pennsylvania .....	210.8	103.3			
Texas .....	926.9	455.1			
Utah .....	22.7	(CC)			
<b>37282, AIRCRAFT PROPELLERS AND HELICOPTER ROTORS</b>					
United States .....	191.0	( <sup>1</sup> )			
California .....	8.6	(NA)			
Connecticut .....	131.2	(NA)			

Note: For 1977, the following value ranges (in million dollars) substitute for actual figures withheld to avoid disclosing data for individual companies: AA—less than \$2.0 but not 0; BB—\$2.0 to \$4.9; CC—\$5.0 to \$9.9; EE—\$10.0 to \$19.9; FF—\$20.0 to \$49.9; GG—\$50.0 or more.

<sup>1</sup>For 1977, product class 37282 was included with product class 37281 to avoid disclosing data for individual companies.



**Table 6c. Product Classes—Value Shipped by All Producers: 1982 and Earlier Years**

[Million dollars. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

1982 product code	Product class	1982	1981 <sup>1</sup>	1980 <sup>1</sup>	1979 <sup>1</sup>	1978 <sup>1</sup>	1977	1972	1967
3721-	<b>Aircraft</b> .....	24 235.1	25 108.7	23 365.6	18 925.5	13 610.4	12 052.6	7 538.2	9 172.2
37211	Military aircraft.....	9 834.5	6 869.6	5 892.1	4 429.7	3 719.2	4 579.6	2 802.9	4 408.0
37215	Civilian aircraft.....	8 769.4	13 136.6	13 053.4	10 883.1	6 372.0	4 706.1	3 261.5	3 504.9
37217	Modification, conversion, and overhaul of aircraft.....	2 783.4	1 690.7	1 311.6	863.2	797.9	747.2	373.9	596.8
37218	Aeronautical services on aircraft, n.e.c.....	2 817.1	3 369.5	3 095.3	2 744.2	2 696.0	1 988.2	1 067.1	635.2
37210	Complete aircraft, n.s.k.....	30.7	42.2	13.2	5.2	25.3	31.7	32.8	27.3
3724-	<b>Aircraft engines and engine parts</b> .....	11 640.8	11 555.8	10 010.3	7 884.2	6 028.0	4 994.6	3 069.7	3 759.8
37241	Aircraft engines for military aircraft.....	(D)	2 197.6	1 472.7	1 112.7	815.8	1 047.9	437.1	1 087.6
37242	Aircraft engines for civilian aircraft.....	2 142.6	2 745.9	2 839.6	2 167.7	1 404.7	937.0	609.2	690.7
37243	Aeronautical services on aircraft engines.....	(D)	882.8	1 024.2	1 024.5	978.1	660.8	692.1	526.5
37244	Aircraft engine parts and accessories.....	5 725.5	5 627.9	4 617.0	3 532.7	2 796.6	2 308.5	1 306.7	1 422.9
37240	Aircraft engine and engine parts, n.s.k.....	79.4	101.6	56.8	46.7	(S)	40.4	24.6	31.8
3728-	<b>Aircraft equipment, n.e.c.</b> .....	10 789.1	10 508.6	9 946.0	8 051.8	6 455.8	5 761.5	3 436.9	4 465.0
37281	Aircraft parts and accessories, n.e.c.....	9 862.4	10 061.1	9 627.5	7 781.7	6 100.0	5 436.8	3 227.4	4 204.9
37282	Aircraft propellers and helicopter rotors.....	191.0							
37283	Research and development on aircraft parts.....	432.2	299.7	215.0	200.6	137.9	161.4	99.4	85.7
37280	Aircraft equipment, n.e.c., n.s.k.....	303.5	147.8	103.5	69.5	(S)	163.2	110.1	174.4
3761-	<b>Guided missiles and space vehicles</b> .....	8 585.6	7 556.8	6 460.1	5 973.9	5 210.1	4 848.2	3 705.3	4 367.3
37611	Complete missiles.....	2 644.8	2 682.9	2 350.8	1 932.1	1 702.7	1 685.5	1 246.3	815.7
37612	Complete space vehicles and booster stages.....	2 010.7	2 320.0	1 898.5	1 151.9	1 052.1	822.1	754.9	1 203.2
37613	Research and development on complete missiles.....	1 504.0	1 033.8	847.9	1 329.5	1 105.3	871.5	660.8	867.3
37614	Research and development on complete space vehicles.....	987.2	623.5	583.0	717.3	836.2	918.1	599.7	743.6
37615	Other services on complete missiles and space vehicles.....	1 438.3	896.5	779.7	842.7	513.6	549.9	440.1	734.7
37610	Guided missiles and space vehicles, n.s.k.....	.5	-	.2	.4	.3	1.1	3.5	2.9
3764-	<b>Space propulsion units and parts</b> .....	2 199.1	2 084.9	1 738.8	1 294.0	1 128.0	930.1	740.3	1 054.0
37645	Missile or space vehicle propulsion units.....	960.7	811.3	736.2	574.2	488.7	370.6	434.6	451.7
37646	Research and development on propulsion units.....	694.8	822.3	569.8	444.8	440.0	345.8	143.4	389.1
37647	Other services on propulsion units.....	238.0	123.6	111.5	87.5	78.7	105.0	115.0	88.4
37648	Propulsion unit parts and accessories.....	301.5	325.6	319.0	186.0	117.6	105.6	47.1	93.9
37640	Space propulsion units and parts, n.s.k.....	4.2	2.1	2.3	1.6	(S)	3.1	.2	30.9
3769-	<b>Space vehicle equipment, n.e.c.</b> .....	2 573.9	2 153.3	1 775.5	1 533.5	1 197.0	882.4	825.4	1 077.2
37692	Missile and space vehicle parts, n.e.c.....	1 161.0	778.6	644.8	555.7	468.1	420.0	418.7	674.0
37694	Research and development on missile and space vehicle parts, n.e.c.....	1 403.3	1 368.0	1 125.1	972.8	722.1	455.2	406.7	403.7
37690	Space vehicle equipment, n.e.c., n.s.k.....	9.6	6.7	5.5	5.0	(S)	7.2	(NA)	-

<sup>1</sup>Figures are estimates derived from a representative sample of manufacturing establishments canvassed in annual survey of manufactures and, therefore, may differ from results that would be obtained from a complete canvass of all manufacturing establishments. Standard errors associated with estimates are published in annual survey of manufactures volumes for this period.

**Table 7. Materials Consumed by Kind: 1982 and 1977**

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 material code	Material	1982		1977	
		Quantity <sup>1</sup>	Delivered cost (million dollars)	Quantity <sup>1</sup>	Delivered cost (million dollars)
	<b>INDUSTRY 3721, AIRCRAFT</b>				
	<b>Materials, parts, containers, and supplies</b> .....	(X)	14 315.3	(X)	6 092.2
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes..... 1,000 s tons..	*7.1	7.6	(S)	6.5
331012	Sheet and strip..... do..	(S)	1.5	(S)	4.9
331013	Plates..... do..	(S)	1.5	(S)	(3)
331015	Structural shapes..... do..	(S)	1.3	(S)	(3)
331017	Wire and wire products..... do..			(S)	(3)
331019	All other carbon steel mill shapes and forms..... do..	4.4	4.1	321.0	320.7
	Alloy steel, except stainless:				
331021	Bars and bar shapes..... do..	*4.8	3.2	(S)	5.2
331029	All other alloy steel mill shapes and forms..... do..	**2.8	2.4	2.2	3.0
	Stainless steel:				
331033	Sheet and strip..... do..	(S)	3.5	**1.5	5.8
331050	All other stainless steel mill shapes and forms..... do..	(S)	7.9	(S)	9.3
	Insulated wire and cable, except magnet wire:				
335792	Copper (quantity of copper content).....million lb..	(S)	39.7	(S)	21.7
335793	Aluminum (quantity at aluminum content).....do..	(D)	(D)	(S)	.4
335770	Magnet wire.....do..	(D)	(D)	(D)	(D)
	Copper and copper-base alloy:				
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes.....do..	**1.0	1.0	(S)	1.7
335143	Plate, sheet, and strip, including military cups and discs.....do..	(D)	(D)	(S)	(4)
335152	Pipe and tube.....do..	(D)	(D)	(S)	41.6
335728	Bare wire for electrical conduction only.....do..	(D)	(D)	**4	.7
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil.....do..	*69.4	99.3	**80.9	99.1
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc.....do..	**35.5	83.4	**27.3	63.2
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.).....do..	(S)	8.0	3.2	7.9
335601	Titanium and titanium-base alloy.....1,000 lb..	(S)	35.8	(S)	28.3
339915	Metal powders.....million lb..	-	-	(D)	(D)

See footnotes at end of table.

**Table 7. Materials Consumed by Kind: 1982 and 1977—Con.**

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 material code	Material	1982		1977	
		Quantity <sup>1</sup>	Delivered cost (million dollars)	Quantity <sup>1</sup>	Delivered cost (million dollars)
	<b>INDUSTRY 3721, AIRCRAFT—Con.</b>				
	Castings, rough and semifinished:				
	Steel:				
332045	Purchased ..... 1,000 s tons..	*.9	3.8	(S)	5.5
	Produced and consumed .....	-	(X)	(S)	(X)
336100	Aluminum and aluminum-base alloy:				
	Purchased ..... million lb..	*8.2	39.7	**8.7	34.2
	Produced and consumed .....	(Z)	(X)	(S)	(X)
336200	Copper and copper-base alloy:				
	Purchased ..... do..	(S)	.3	(S)	.3
	Produced and consumed .....	-	(X)	(S)	(X)
336910	Zinc and zinc base-alloy:				
	Purchased ..... do..	-	-	(X)	( <sup>6</sup> )
	Produced and consumed .....	-	(X)	(X)	(X)
336901	Other nonferrous:				
	Purchased ..... do..	(D)	(D)	(X)	( <sup>6</sup> )
	Produced and consumed .....	-	(X)	(X)	(X)
	Forgings:				
346200	Iron and steel:				
	Purchased ..... 1,000 s tons..	(S)	15.5	(S)	27.9
	Produced and consumed .....	-	(X)	(S)	(X)
346310	Aluminum and aluminum-base alloy:				
	Purchased ..... million lb..	14.5	63.6	**7.9	45.5
	Produced and consumed .....	(Z)	(X)	(S)	(X)
346326	Titanium and titanium-base alloy:				
	Purchased ..... do..	(D)	(D)	*1.9	37.0
	Produced and consumed .....	(Z)	(X)	(S)	(X)
	Electric motors and generators:				
	Fractional horsepower electric motors (less than 1 hp):				
362110	Timing motors, synchronous and subsynchronous:				
	Purchased ..... thousands..	(S)	3.5	(S)	.5
	Produced and consumed .....	-	(X)	(S)	(X)
362115	Other fractional horsepower electric motors, including timing motors:				
	Purchased ..... do..	(D)	(D)	**22.7	3.6
	Produced and consumed .....	-	(X)	(S)	(X)
362120	Integral horsepower motors and generators (1 hp or more):				
	Purchased ..... do..	(S)	6.5	(D)	(D)
	Produced and consumed .....	-	(X)	(S)	(X)
	Bearings:				
356218	Ball .....	(X)	10.0	(X)	15.0
356201	Roller .....	(X)	(D)	(X)	8.3
	Aerospace type fluid power parts and components	(X)	-	(X)	65.7
349427	Valves (hydraulic and pneumatic) .....	(X)	26.9	(X)	( <sup>6</sup> )
349461	Hose or tube fittings and assemblies (hydraulic and pneumatic) .....	(X)	10.8	(X)	( <sup>6</sup> )
359923	Cylinders and rotary actuators (hydraulic and pneumatic) .....	(X)	31.1	(X)	( <sup>6</sup> )
356121	Pumps and motors (hydraulic) .....	(X)	30.3	(X)	( <sup>6</sup> )
356923	Filters for hydraulic fluid power systems .....	(X)	(D)	(X)	( <sup>6</sup> )
220129	Broad woven fabrics (cotton, wool, manmade fiber fabrics, etc.) ..... mil lin yd..	(S)	41.3	(X)	19.2
345001	Bolts, nuts, screws, rivets, washers, and screw machine products .....	(X)	137.0	(X)	123.8
285101	Paints, varnishes, lacquers, shellacs, japans, and enamels, and allied products ..... 1,000 gal..	(S)	30.8	(X)	30.2
366211	Radio and electronic communication equipment and navigation aids, airborne transmitters and receivers, radar, electronic-type fire control equipment, etc. ....	(X)	529.7	(X)	620.9
367001	Resistors, capacitors, transformers, transducers, and other electronic-type components and accessories, except electron tubes and semiconductors .....	(X)	91.8	(X)	161.9
383241	Sighting, tracking, and fire control equipment, optical type	(X)	72.0	(X)	23.2
354501	Cutting tools for machine tools .....	(X)	14.5	(X)	*21.0
342973	Aircraft metal hardware .....	(X)	52.0	(X)	*64.0
381111	Aircraft flight instruments .....	(X)	101.7	(X)	*70.0
382911	Aircraft engine instruments .....	(X)	71.2	(X)	*146.0
372400	Aircraft engines .....	(X)	975.9	(X)	*860.0
372440	Aircraft engine parts .....	(X)	62.2	(X)	*36.0
369401	Engine electrical equipment .....	(X)	(D)	(X)	*59.0
372851	Aircraft propellers and parts thereof .....	(X)	38.8	(X)	*59.0
372810	Aircraft parts, except engines and engine parts .....	(X)	1 453.2	(X)	*2 055.0
376480	Guided missile and space vehicle engine parts .....	(X)	-	(X)	-
376920	Guided missile and space vehicle airframe parts .....	(X)	-	(X)	( <sup>6</sup> )
362493	Graphite prepreg materials ..... million lb..	(D)	(D)	(X)	( <sup>6</sup> )
970099	All other materials and components, parts, containers, and supplies .....	(X)	6 289.5	(X)	*1 105.5
971000	Materials, parts, containers, and supplies, n.s.k. <sup>2</sup> .....	(X)	3 704.3	(X)	88.3
	<b>INDUSTRY 3724, AIRCRAFT ENGINES AND ENGINE PARTS</b>				
	Materials, parts, containers, and supplies .....	(X)	5 059.9	(X)	2 232.6
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes ..... 1,000 s tons..	7.3	8.7	**5.2	3.8
331012	Sheet and strip .....	6.0	3.2	6.4	4.6
331013	Plates .....	4.6	2.8	3.5	1.8
331015	Structural shapes .....	-	-	( <sup>7</sup> )	( <sup>7</sup> )
331017	Wire and wire products .....	-	-	72.9	72.7
331019	All other carbon steel mill shapes and forms .....	16.3	7.9	**3.1	3.1
	Alloy steel, except stainless:				
331021	Bars and bar shapes .....	*44.3	89.5	19.5	40.0
331029	All other alloy steel mill shapes and forms .....	**13.3	47.5	2.8	23.0
	Stainless steel:				
331033	Sheet and strip .....	(S)	21.3	3.8	13.8
331050	All other stainless steel mill shapes and forms .....	**16.3	32.1	(S)	13.9

See footnotes at end of table.



Table 7. **Materials Consumed by Kind: 1982 and 1977—Con.**

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 material code	Material	1982		1977	
		Quantity <sup>1</sup>	Delivered cost (million dollars)	Quantity <sup>1</sup>	Delivered cost (million dollars)
	<b>INDUSTRY 3724, AIRCRAFT ENGINES AND ENGINE PARTS—Con.</b>				
	Mill shapes and forms, except castings and forgings—Con.				
	Insulated wire and cable, except magnet wire:				
335792	Copper (quantity of copper content) .....million lb..	1.0	2.7	**9	1.5
335793	Aluminum (quantity of aluminum content) .....do..	(Z)	(D)	(D)	(D)
335770	Magnet wire .....do..	(Z)	.2	(D)	(D)
	Copper and copper-base alloy:				
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes .....do..	**6	.3	(S)	.2
335143	Plate, sheet, and strip, including military cups and discs .....do..	(D)	(D)	.7	.6
335152	Pipe and tube .....do..	(D)	(D)	(S)	.1
335728	Bare wire (for electrical conduction only) .....do..	(Z)	(Z)	(D)	(D)
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil .....do..	(S)	3.7	**1.8	1.8
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc. ....do..	54.0	31.4	(S)	7.0
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.) .....do..	(S)	(S)	(S)	1.1
335601	Titanium and titanium-base alloy .....1,000 lb..	5.4	91.8	1.8	16.3
339915	Metal powders .....million lb..	(S)	3.9	9.2	4.5
	Castings, rough and semifinished:				
332045	Steel:				
	Purchased .....1,000 s tons..	(S)	115.6	47.3	112.4
	Produced and consumed .....do..	-	(X)	(S)	(X)
336100	Aluminum and aluminum-base alloy:				
	Purchased .....million lb..	(S)	93.1	*29.8	57.3
	Produced and consumed .....do..	-	(X)	(S)	(X)
336200	Copper and copper-base alloy:				
	Purchased .....do..	(D)	(D)	.8	3.7
	Produced and consumed .....do..	-	(X)	(S)	(X)
336910	Zinc and zinc-base alloy:				
	Purchased .....do..	(D)	(D)	(X)	( <sup>9</sup> )
	Produced and consumed .....do..	(D)	(X)	(X)	( <sup>9</sup> )
356901	Other nonferrous:				
	Purchased .....do..	-	-	(X)	( <sup>9</sup> )
	Produced and consumed .....do..	-	(X)	(X)	( <sup>9</sup> )
	Forgings:				
346200	Iron and steel:				
	Purchased .....1,000 s tons..	*64.4	510.1	30.5	106.1
	Produced and consumed .....do..	-	(X)	(S)	(X)
346310	Aluminum and aluminum-base alloy:				
	Purchased .....million lb..	(S)	15.1	(S)	4.6
	Produced and consumed .....do..	-	(X)	(S)	(X)
346326	Titanium and titanium-base alloy:				
	Purchased .....do..	**17.5	345.3	**9.8	62.6
	Produced and consumed .....do..	(D)	(X)	(S)	(X)
	Electric motors and generators:				
	Fractional horsepower electric motors (less than 1 hp):				
362110	Timing motors, synchronous and subsynchronous:				
	Purchased .....thousands..	(D)	(D)	(S)	2.7
	Produced and consumed .....do..	-	(X)	(S)	(X)
362115	Other fractional horsepower electric motors, excluding timing motors:				
	Purchased .....do..	(D)	(D)	(D)	(D)
	Produced and consumed .....do..	-	(X)	(S)	(X)
362120	Integral horsepower motors and generators (1 hp or more):				
	Purchased .....do..	(D)	(D)	(D)	(D)
	Produced and consumed .....do..	-	(X)	(S)	(X)
	Bearings:				
356218	Ball .....do..	(X)	45.1	(X)	23.5
356201	Roller .....do..	(X)	40.8	(X)	21.9
	Aerospace type fluid power parts and components	(X)	-	(X)	(D)
349427	Valves (hydraulic and pneumatic) .....do..	(X)	(D)	(X)	( <sup>9</sup> )
349461	Hose or tube fittings and assemblies (hydraulic and pneumatic) .....do..	(X)	(D)	(X)	( <sup>9</sup> )
359923	Cylinders and rotary actuators (hydraulic and pneumatic) .....do..	(X)	(D)	(X)	( <sup>9</sup> )
356121	Pumps and motors (hydraulic) .....do..	(X)	(D)	(X)	( <sup>9</sup> )
356923	Filters for hydraulic fluid power systems .....do..	(X)	(D)	(X)	( <sup>9</sup> )
220129	Broad woven fabrics (cotton, wool, manmade fiber fabrics, etc.) .....mil lin yd..	(X)	-	(D)	(D)
345001	Bolts, nuts, screws, rivets, washers, and screw machine products .....do..	(X)	63.8	(X)	27.9
285101	Paints, varnishes, lacquers, shellacs, japans, and enamels and allied products .....1,000 gal..	**136.9	2.1	(X)	1.0
366211	Radio and electronic communication equipment and navigation aids, airborne transmitters and receivers, radar, electronic-type fire control equipment, etc. ....do..	(X)	-	(X)	(D)
367001	Resistors, capacitors, transformers, transducers, and other electronic-type components and accessories, except electron tubes and semiconductors .....do..	(X)	11.5	(X)	13.1
383241	Sighting, tracking, and fire control equipment, optical type .....do..	(X)	-	(X)	(D)
354501	Cutting tools for machine tools .....do..	(X)	64.2	(X)	*38.0
342973	Aircraft metal hardware .....do..	(X)	(D)	(X)	-
381111	Aircraft flight instruments .....do..	(X)	(Z)	(X)	-
382911	Aircraft engine instruments .....do..	(X)	(D)	(X)	-
372440	Aircraft engine parts .....do..	(X)	646.0	(X)	( <sup>9</sup> )
369401	Engine electrical equipment .....do..	(X)	(D)	(X)	( <sup>9</sup> )
372851	Aircraft propellers and parts thereof .....do..	(X)	(D)	(X)	-
372810	Aircraft parts, except engines and engine parts .....do..	(X)	69.8	(X)	( <sup>9</sup> )
376480	Guided missile and space vehicle engine parts .....do..	(X)	(D)	(X)	-
376920	Guided missile and space vehicle airframe parts .....do..	(X)	(D)	(X)	-
362493	Graphite prepreg materials .....do..	(X)	(D)	(X)	( <sup>9</sup> )
970099	All other materials and components, parts, containers, and supplies .....do..	(X)	1 796.5	(X)	*1 537.9
971000	Materials, parts, containers, and supplies, n.s.k. <sup>2</sup> .....do..	(X)	590.3	(X)	54.6

See footnotes at end of table.

**Table 7. Materials Consumed by Kind: 1982 and 1977—Con.**

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 material code	Material	1982		1977	
		Quantity <sup>1</sup>	Delivered cost (million dollars)	Quantity <sup>1</sup>	Delivered cost (million dollars)
	<b>INDUSTRY 3728, AIRCRAFT EQUIPMENT, N.E.C.</b>				
	Materials, parts, containers, and supplies -----	(X)	3 399.6	(X)	1 470.3
	Mill shapes and forms, except castings:				
	Carbon steel:				
331011	Bars and bar shapes ----- 1,000 s tons..	**12.6	8.2	(S)	8.0
331012	Sheet and strip ----- do..	*6.8	3.4	*2.8	1.7
331013	Plates ----- do..	(S)	4.0	*5.8	3.3
331015	Structural shapes ----- do..	*5.4	5.9	1.0	.5
331017	Wire and wire products ----- do..	*.4	1.0	**8	.5
331019	All other carbon steel mill shapes and forms ----- do..	**11.2	12.3	(S)	4.5
	Alloy steel, except stainless:				
331021	Bars and bar shapes ----- do..	(S)	9.8	*14.7	17.0
331029	All other alloy steel mill shapes and forms ----- do..	*7.9	10.9	7.7	8.3
	Stainless steel:				
331033	Sheet and strip ----- do..	(S)	7.4	(S)	9.1
331050	All other stainless steel mill shapes and forms ----- do..	(S)	13.5	(S)	9.1
	Insulated wire and cable, except magnet wire:				
335792	Copper (quantity of copper content) ----- million lb..	(S)	8.8	( <sup>9</sup> )	( <sup>9</sup> )
335793	Aluminum (quantity of aluminum content) ----- do..	(D)	(D)	*9.7	*9.7
335770	Magnet wire ----- do..	*.3	1.0	**3	.6
	Copper and copper-base alloy:				
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes ----- do..	(S)	1.3	*.7	1.4
335143	Plate, sheet, and strip, including military cups and discs ----- do..	(S)	.7	.1	.3
335152	Pipe and tube ----- do..	(S)	.3	*.4	.7
335728	Bare wire for electrical conduction only ----- do..	(S)	.7	.2	.2
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil ----- do..	(S)	40.4	(S)	22.4
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc. ----- do..	(S)	87.5	(S)	29.8
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.) ----- do..	(S)	4.5	*3.8	5.3
335601	Titanium and titanium-base alloy ----- 1,000 lb..	(S)	66.3	(S)	6.6
339915	Metal powders ----- million lb..	(S)	10.7	(D)	(D)
	Castings (rough and semifinished):				
332045	Steel:				
	Purchased ----- 1,000 s tons..	(S)	13.8	**10.3	17.1
	Produced and consumed ----- do..	-	(X)	(S)	(X)
336100	Aluminum and aluminum-base alloy:				
	Purchased ----- million lb..	(S)	26.5	(S)	20.0
	Produced and consumed ----- do..	(S)	(X)	(S)	(X)
336200	Copper and copper-base alloy:				
	Purchased ----- do..	(S)	2.8	(S)	2.8
	Produced and consumed ----- do..	-	(X)	(S)	(X)
336910	Zinc and zinc-base alloy:				
	Purchased ----- do..	(D)	(D)	(X)	( <sup>9</sup> )
	Produced and consumed ----- do..	-	(X)	(X)	( <sup>9</sup> )
336901	Other nonferrous:				
	Purchased ----- do..	(S)	47.1	(X)	( <sup>9</sup> )
	Produced and consumed ----- do..	(D)	(X)	(X)	( <sup>9</sup> )
	Forgings:				
346200	Iron and steel:				
	Purchased ----- 1,000 s tons..	(S)	87.6	21.8	31.9
	Produced and consumed ----- do..	(D)	(X)	(S)	(X)
346310	Aluminum and aluminum-base alloy:				
	Purchased ----- million lb..	(S)	63.1	(S)	30.8
	Produced and consumed ----- do..	(D)	(X)	(S)	(X)
346326	Titanium and titanium-base alloy:				
	Purchased ----- do..	*3.1	15.1	(S)	4.2
	Produced and consumed ----- do..	(D)	(X)	(S)	(X)
	Electric motors and generators:				
362110	Fractional horsepower electric motors (less than 1 hp):				
	Timing motors, synchronous and subsynchronous:				
	Purchased ----- thousands..	(S)	2.6	(D)	(D)
	Produced and consumed ----- do..	-	(X)	(D)	(X)
362115	Other fractional horsepower electric motors (excluding timing motors):				
	Purchased ----- do..	(S)	7.3	(S)	2.0
	Produced and consumed ----- do..	(D)	(X)	(S)	(X)
362120	Integral horsepower motors and generators (1 hp or more):				
	Purchased ----- do..	(S)	(D)	(S)	3.3
	Produced and consumed ----- do..	(D)	(X)	(S)	(X)
	Bearings:				
356218	Ball -----	(X)	21.7	(X)	9.3
356201	Roller -----	(X)	13.5	(X)	3.9
	Aerospace type fluid power parts and components -----	(X)	-	(X)	9.2
349427	Valves (hydraulic and pneumatic) -----	(X)	15.4	(X)	( <sup>9</sup> )
349461	Hose or tube fittings and assemblies -----	(X)	.7	(X)	( <sup>9</sup> )
359923	Cylinders and rotary activators (hydraulic and pneumatic) -----	(X)	4.7	(X)	( <sup>9</sup> )
356121	Pumps and motors (hydraulic) -----	(X)	8.0	(X)	( <sup>9</sup> )
356923	Filters for hydraulic fluid power systems -----	(X)	(D)	(X)	( <sup>9</sup> )
220129	Broad woven fabrics (cotton, wool, manmade fiber fabrics, etc.) ----- million lin yd..	(S)	7.0	(S)	4.5
345001	Bolts, nuts, screws, rivets, washers, and screw machine products -----	(X)	67.9	(X)	33.7
285101	Paints, varnishes, lacquers, shellacs, japans, enamels, and allied products ----- 1,000 gal..	(S)	12.0	(X)	2.6
366211	Radio and electronic communication equipment and navigation aids, airborne transmitters and receivers, radar, electronic-type fire control equipment, etc. -----	(X)	11.3	(X)	(D)
367001	Resistors, capacitors, transformers, transducers, and other electronic-type components and accessories, except electron tubes and semiconductors -----	(X)	145.3	(X)	30.0
383241	Sighting, tracking, and fire control equipment, optical type -----	(X)	.1	(X)	(D)
354501	Cutting tools for machine tools -----	(X)	31.4	(X)	*13.0
342973	Aircraft metal hardware -----	(X)	21.7	(X)	*15.0
381111	Aircraft flight instruments -----	(X)	(D)	(X)	( <sup>9</sup> )
382911	Aircraft engine instruments -----	(X)	(D)	(X)	( <sup>9</sup> )
372440	Aircraft engine parts -----	(X)	(D)	(X)	*23.0

See footnotes at end of table.



Table 7. Materials Consumed by Kind: 1982 and 1977—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 material code	Material	1982		1977	
		Quantity <sup>1</sup>	Delivered cost (million dollars)	Quantity <sup>1</sup>	Delivered cost (million dollars)
INDUSTRY 3728, AIRCRAFT EQUIPMENT, N.E.C. —Con.					
369401	Engine electrical equipment .....	(X)	(D)	(X)	53.0
372851	Aircraft propellers and parts thereof .....	(X)	(D)	(X)	( <sup>9</sup> )
372810	Aircraft parts, except engines and engine parts .....	(X)	136.0	(X)	5252.0
376480	Guided missile and space vehicle engine parts .....	(X)	6.2	(X)	( <sup>9</sup> )
376920	Guided missile and space vehicle airframe parts .....	(X)	(D)	(X)	( <sup>9</sup> )
362493	Graphite prepreg materials .....	.1	(D)	(X)	( <sup>9</sup> )
970099	All other materials and components, parts, containers, and supplies .....	(X)	1 645.5	(X)	8657.3
971000	Materials, parts, containers, and supplies, n.s.k. <sup>2</sup> .....	(X)	638.3	(X)	163.4
INDUSTRY 3761, GUIDED MISSILES AND SPACE VEHICLES					
Materials, parts, containers, and supplies .....		(X)	2 533.4	(X)	1 368.7
Mill shapes and forms, except castings and forgings:					
Carbon steel:					
331011	Bars and bar shapes .....	*.4	.5	**1.0	.6
331012	Sheet and strip .....	(Z)	(Z)	(S)	( <sup>10</sup> )
331013	Plates .....	(S)	.2	(S)	( <sup>10</sup> )
331015	Structural shapes .....	(D)	(D)	(S)	( <sup>10</sup> )
331017	Wire and wire products .....	(D)	(D)	(S)	( <sup>10</sup> )
331019	All other carbon steel mill shapes and forms .....	(D)	(D)	(S)	107.3
Alloy steel, except stainless:					
331021	Bars and bar shapes .....	(D)	(D)	(S)	( <sup>11</sup> )
331029	All other alloy steel mill shapes and forms .....	-	-	(S)	11.5
Stainless steel:					
331033	Sheet and strip .....	(Z)	.2	(S)	( <sup>12</sup> )
331050	All other stainless steel mill shapes and forms .....	*.2	1.1	(S)	121.6
Insulated wire and cable, except magnet wire:					
335792	Copper .....	(S)	4.5	.3	2.3
335793	Aluminum .....	(D)	(D)	(S)	.1
335770	Magnet wire .....	-	-	(D)	(D)
Copper and copper-base alloy:					
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes .....	(D)	(D)	(D)	(D)
335143	Plate, sheet, and strip, including military cups and discs .....	(D)	(D)	(S)	( <sup>13</sup> )
335152	Pipe and tube .....	(D)	(D)	(S)	( <sup>13</sup> )
335728	Bare wire for electrical conduction only .....	(D)	(D)	(S)	13.1
Aluminum and aluminum-base alloy:					
335301	Sheet, plate, and foil .....	2.8	3.8	**2.6	3.3
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc. ....	(D)	(D)	*1.9	1.4
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.) .....	(D)	(D)	**2	.2
335601	Titanium and titanium-base alloy .....	(D)	(D)	(S)	.6
339915	Metal powders .....	-	-	(D)	(D)
Castings (rough and semifinished):					
332045	Steel:				
	Purchased .....	(D)	(D)	(S)	1.5
	Produced and consumed .....	-	(X)	(S)	(X)
336100	Aluminum and aluminum-base alloy:				
	Purchased .....	6.0	7.4	**1.8	4.2
	Produced and consumed .....	-	(X)	(S)	(X)
336200	Copper and copper-base alloy:				
	Purchased .....	(D)	(D)	(D)	(D)
	Produced and consumed .....	-	(X)	(S)	(X)
336910	Zinc and zinc-base alloy:				
	Purchased .....	-	-	(X)	( <sup>9</sup> )
	Produced and consumed .....	-	(X)	(X)	( <sup>9</sup> )
336901	Other nonferrous:				
	Purchased .....	(D)	(D)	(X)	( <sup>9</sup> )
	Produced and consumed .....	-	(X)	(X)	( <sup>9</sup> )
Forgings:					
346200	Iron and steel:				
	Purchased .....	(D)	(D)	3.2	.8
	Produced and consumed .....	(D)	(X)	(S)	(X)
346310	Aluminum and aluminum-base alloy:				
	Purchased .....	2.2	3.3	6.4	1.8
	Produced and consumed .....	-	(X)	(S)	(X)
346326	Titanium and titanium-base alloy:				
	Purchased .....	(D)	(D)	81.1	1.4
	Produced and consumed .....	-	(X)	(S)	(X)
Electric motors and generators:					
Fractional horsepower electric motors (less than 1 hp):					
Timing motors, synchronous and subsynchronous:					
362110	Purchased .....	(D)	(D)	**11.1	1.5
	Produced and consumed .....	-	(X)	(S)	(X)
362115	Other fractional horsepower electric motors, excluding timing motors:				
	Purchased .....	(D)	(D)	(D)	(D)
	Produced and consumed .....	-	(X)	(S)	(X)
362120	Integral horsepower motors and generators (1 hp or more):				
	Purchased .....	-	-	-	-
	Produced and consumed .....	-	(X)	(S)	(X)
Bearings:					
356218	Ball .....	(X)	.5	(X)	1.1
356201	Roller .....	(X)	-	(X)	.5
Aerospace type fluid power parts and components					
349427	Valves (hydraulic and pneumatic) .....	(X)	-	(X)	25.3
349461	Hose or tube fittings and assemblies (hydraulic and pneumatic) .....	(X)	2.7	(X)	( <sup>9</sup> )
359923	Cylinders and rotary actuators (hydraulic and pneumatic) .....	(X)	(D)	(X)	( <sup>9</sup> )
356121	Pumps and motors (hydraulic) .....	(X)	(D)	(X)	( <sup>9</sup> )
356923	Filters for hydraulic fluid power systems .....	(X)	(D)	(X)	( <sup>9</sup> )

See footnotes at end of table.

Table 7. Materials Consumed by Kind: 1982 and 1977—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 material code	Material	1982		1977	
		Quantity <sup>1</sup>	Delivered cost (million dollars)	Quantity <sup>1</sup>	Delivered cost (million dollars)
	<b>INDUSTRY 3761, GUIDED MISSILES AND SPACE VEHICLES—Con.</b>				
220129	Broad woven fabrics (cotton, wool, manmade fiber fabrics, etc.) ..... million lin yd..	(X)	-	(D)	(D)
345001	Bolts, nuts, screws, rivets, washers, and screw machine products .....	(X)	20.2	(X)	7.0
285101	Paints, varnishes, lacquers, shellacs, japans, and enamels and allied products ..... 1,000 gal..	(S)	2.0	(X)	2.1
366211	Radio and electronic communication equipment and navigation aids; airborne transmitters and receivers, radar, electronic-type fire control equipment, etc. ....	(X)	640.7	(X)	44.3
367001	Resistors, capacitors, transformers, transducers, and other electronic-type components and accessories, except electron tubes and semiconductors .....	(X)	146.2	(X)	35.3
383241	Sighting, tracking, and fire control equipment, optical type .....	(X)	(D)	(D)	(D)
354501	Cutting tools for machine tools .....	(X)	(D)	(X)	( <sup>9</sup> )
342973	Aircraft metal hardware .....	(X)	(D)	(X)	( <sup>9</sup> )
381111	Aircraft flight instruments .....	(X)	(D)	(X)	( <sup>9</sup> )
382911	Aircraft engine instruments .....	(X)	-	(X)	( <sup>9</sup> )
372440	Aircraft engine parts .....	(X)	-	(X)	-
369401	Engine electrical equipment .....	(X)	-	(X)	-
372851	Aircraft propellers and parts thereof .....	(X)	-	(X)	-
372810	Aircraft parts, except engines and engine parts .....	(X)	(D)	(X)	<sup>5</sup> 19.0
376480	Guided missile and space vehicle engine parts .....	(X)	24.6	(X)	<sup>5</sup> 15.0
376920	Guided missile and space vehicle airframe parts .....	(X)	(D)	(X)	<sup>9</sup> 863.0
362493	Graphite prepreg materials .....	(X)	(D)	(X)	( <sup>9</sup> )
970099	All other material and components, parts, containers, and supplies .....	(X)	1 169.0	(X)	<sup>9</sup> 268.7
971000	Materials, parts, containers, and supplies, n.s.k. <sup>2</sup> .....	(X)	(Z)	(X)	23.1
	<b>INDUSTRY 3764, SPACE PROPULSION UNITS AND PARTS</b>				
	Materials, parts, containers, and supplies .....	(X)	645.4	(X)	265.8
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes ..... 1,000 s tons..	(D)	(D)	(S)	1.1
331012	Sheet and strip ..... do..	(D)	(D)	(S)	( <sup>10</sup> )
331013	Plates ..... do..	(D)	(D)	(S)	( <sup>10</sup> )
331015	Structural shapes ..... do..	(D)	(D)	(S)	( <sup>10</sup> )
331017	Wire and wire products ..... do..	(D)	(D)	(S)	( <sup>10</sup> )
331019	All other carbon steel mill shapes and forms ..... do..	(D)	(D)	(S)	<sup>10</sup> 3.6
	Alloy steel, except stainless:				
331021	Bars and bar shapes ..... do..	(S)	1.5	(S)	( <sup>11</sup> )
331029	All other alloy steel mill shapes and forms ..... do..	(D)	(D)	(S)	<sup>11</sup> 2.3
	Stainless steel:				
331033	Sheet and strip ..... do..	*1.9	3.6	(S)	.5
331050	All other stainless steel mill shapes and forms ..... do..	(S)	1.3	(S)	.6
	Insulated wire and cable, except magnet wire:				
335792	Copper (quantity of copper content) ..... million lb..	-	-	-	-
335793	Aluminum (quantity of aluminum content) ..... do..	(D)	(D)	-	-
335770	Magnet wire ..... do..	(D)	(D)	-	-
	Copper and copper-base alloy:				
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes ..... do..	(D)	(D)	(D)	(D)
335143	Plate, sheet, and strip, including military cups and discs ..... do..	(D)	(D)	(D)	(D)
335152	Pipe and tube ..... do..	(D)	(D)	-	-
335726	Bare wire for electrical conduction only ..... do..	(D)	(D)	(D)	(D)
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil ..... do..	(S)	1.5	(S)	1.2
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc. .... do..	(S)	2.1	(S)	1.6
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.) ..... do..	(D)	(D)	(D)	(D)
335601	Titanium and titanium-base alloy ..... 1,000 lb..	(D)	(D)	(D)	(D)
339915	Metal powders ..... million lb..	(D)	(D)	(D)	(D)
	Castings (rough and semifinished):				
332045	Steel:				
	Purchased ..... 1,000 s tons..	*.6	4.7	(D)	(D)
	Produced and consumed ..... do..	-	(X)	(S)	(X)
336100	Aluminum and aluminum-base alloy:				
	Purchased ..... million lb..	(S)	3.0	(S)	1.5
	Produced and consumed ..... do..	-	(X)	(S)	(X)
336910	Zinc and zinc-base alloy:				
	Purchased ..... do..	-	-	(X)	( <sup>18</sup> )
	Produced and consumed ..... do..	-	(X)	(X)	(X)
336200	Copper and copper-base alloy:				
	Purchased ..... do..	(D)	(D)	(D)	(D)
	Produced and consumed ..... do..	-	(X)	(S)	(X)
336901	Other nonferrous:				
	Purchased ..... do..	(D)	(D)	(X)	( <sup>18</sup> )
	Produced and consumed ..... do..	-	(X)	(X)	(X)
	Forgings:				
346200	Iron and steel:				
	Purchased ..... 1,000 s tons..	(S)	14.2	(S)	6.7
	Produced and consumed ..... do..	-	14.2	(S)	(X)
346310	Aluminum and aluminum-base alloy:				
	Purchased ..... million lb..	(S)	3.3	(S)	3.3
	Produced and consumed ..... do..	-	(X)	(S)	(X)
346326	Titanium and titanium-base alloy:				
	Purchased ..... do..	(S)	8.3	(D)	(D)
	Produced and consumed ..... do..	-	(X)	(S)	(X)
	Electric motors and generators:				
	Fractional horsepower electric motors (less than 1 hp):				
362110	Timing motors, synchronous and subsynchronous:				
	Purchased ..... 1,000 s tons..	(X)	-	-	-
	Produced and consumed ..... do..	(X)	-	(S)	(X)

See footnotes at end of table.



Table 7. Materials Consumed by Kind: 1982 and 1977—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 material code	Material	1982		1977	
		Quantity <sup>1</sup>	Delivered cost (million dollars)	Quantity <sup>1</sup>	Delivered cost (million dollars)
	<b>INDUSTRY 3764, SPACE PROPULSION UNITS AND PARTS—Con.</b>				
	Electric motors and generators—Con.				
	Fractional horsepower electric motors (less than 1 hp)— Con.				
362115	Other fractional horsepower electric motors, excluding timing motors:				
	Purchased ..... 1,000 s tons..	(X)	(Z)	-	-
	Produced and consumed .....	(X)	(Z)	(S)	(X)
362120	Integral horsepower motors and generators (1 hp or more):				
	Purchased ..... do..	(X)	.7	(D)	(D)
	Produced and consumed .....	(X)	.7	(S)	(X)
356218	Bearings:				
	Ball .....	(X)	1.3	(X)	(D)
356201	Roller .....	(D)	(D)	(X)	(D)
	Aerospace type fluid power parts and components .....	(X)	-	(X)	(D)
349427	Valves (hydraulic and pneumatic) .....	(D)	(D)	(X)	(9)
349461	Hose or tube fittings and assemblies (hydraulic and pneumatic) .....	(X)	.9	(X)	(9)
359923	Cylinders and rotary activators (hydraulic and pneumatic) .....	(D)	(D)	(X)	(9)
356121	Pumps and motors (hydraulic) .....	(X)	2.6	(X)	(X)
356923	Filters for hydraulic fluid power systems .....	(D)	(D)	(X)	(X)
220129	Broad woven fabrics (cotton, wool, manmade fiber fabrics, etc.) ..... million lin yd..	(D)	(D)	334.4	7.5
345001	Bolts, nuts, screws, rivets, washers, and screw machine products .....	(X)	6.8	(X)	(D)
285101	Paints, varnishes, lacquers, shellacs, japans, and enamels and allied products ..... 1,000 gal..	(D)	(D)	(X)	(D)
366211	Radio and electronic communication equipment, and navigation aids, airborne transmitters and receivers, radar, electronic-type fire control equipment, etc. ....	(D)	(D)	(X)	4.0
367001	Resistors, capacitors, transformers, transducers, and other electronic-type components and accessories, except electron tubes and semiconductors .....	(X)	6.6	(X)	5.3
383241	Sighting, tracking, and fire control equipment, optical type .....	(X)	-	(X)	(9)
354501	Cutting tools for machine tools .....	(X)	4.0	(X)	(9)
342973	Aircraft metal hardware .....	(D)	(D)	(X)	(9)
381111	Aircraft flight instruments .....	(X)	-	(X)	(9)
382911	Aircraft engine instruments .....	(X)	-	(X)	(9)
372440	Aircraft engine parts .....	(X)	-	(X)	(9)
369401	Engine electrical equipment .....	(D)	(D)	(X)	(9)
372851	Aircraft propellers and parts thereof .....	(X)	-	(X)	(9)
372810	Aircraft parts, except engines and engine parts .....	(X)	-	(X)	(9)
376480	Guided missile and space vehicle engine parts .....	(D)	162.6	(X)	(9)
376920	Guided missile and space vehicle parts .....	(D)	(D)	(X)	(9)
362493	Graphite prepreg materials .....	(X)	-	(X)	(9)
970099	All other materials and components, parts, containers, and supplies .....	(X)	225.0	(X)	<sup>8</sup> 166.6
971000	Materials, parts, containers, and supplies, n.s.k. <sup>2</sup> .....	(X)	100.0	(X)	27.7
	<b>INDUSTRY 3769, SPACE VEHICLE EQUIPMENT, N.E.C.</b>				
	Materials, parts, containers, and supplies .....	(X)	566.7	(X)	84.7
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes ..... 1,000 s tons..	(S)	.3	(S)	( <sup>14</sup> )
331012	Sheet and strip ..... do..	(S)	.1	(S)	( <sup>14</sup> )
331013	Plates ..... do..	-	(D)	(S)	( <sup>14</sup> )
331015	Structural shapes ..... do..	-	(D)	(S)	( <sup>14</sup> )
331017	Wire and wire products ..... do..	-	-	(S)	( <sup>14</sup> )
331019	All other carbon steel mill shapes and forms ..... do..	(D)	(D)	(S)	<sup>14</sup> 1.7
	Alloy steel, except stainless:				
331021	Bars and bar shapes ..... do..	(D)	(D)	(S)	( <sup>11</sup> )
331029	All other alloy steel mill shapes and forms ..... do..	-	(D)	(S)	<sup>11</sup> 1.5
	Stainless steel:				
331033	Sheet and strip ..... do..	(Z)	(Z)	.1	.2
331050	All other stainless steel mill shapes and forms ..... do..	(D)	(D)	(S)	1.4
	Insulated wire and cable, except magnet wire:				
335792	Copper (quantity of copper content) ..... million lb..	(D)	(D)	(S)	.1
335793	Aluminum (quantity of aluminum content) ..... do..	-	-	-	-
335770	Magnet wire ..... do..	-	-	(D)	(D)
	Copper and copper-base alloy:				
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes ..... do..	(D)	(D)	(D)	(D)
335143	Plate, sheet, and strip, including military cups and discs ..... do..	-	-	(D)	(D)
335152	Pipe and tube ..... do..	-	-	(D)	(D)
335728	Bare wire (for electrical conduction only) ..... do..	-	-	-	-
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil ..... million lb..	(S)	2.3	(D)	(D)
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc. .... do..	(D)	(D)	(S)	.1
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.) ..... million lb..	<sup>*</sup> 2	.6	(D)	(D)
335601	Titanium and titanium-base alloy ..... 1,000 lb..	-	-	(S)	.4
339915	Metal powders ..... million lb..	-	-	-	-
	Castings (rough and semifinished):				
332045	Steel:				
	Purchased ..... 1,000 s tons..	(X)	.6	(D)	(D)
	Produced and consumed ..... do..	(X)	.6	(S)	(X)
336100	Aluminum and aluminum-base alloy:				
	Purchased ..... million lb..	(X)	.5	.3	1.2
	Produced and consumed ..... do..	(X)	.5	(S)	(X)
336200	Copper and copper-base alloy:				
	Purchased ..... do..	(X)	-	-	-
	Produced and consumed ..... do..	(X)	-	-	(X)

See footnotes at end of table.

**Table 7. Materials Consumed by Kind: 1982 and 1977—Con.**

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 material code	Material	1982		1977	
		Quantity <sup>1</sup>	Delivered cost (million dollars)	Quantity <sup>1</sup>	Delivered cost (million dollars)
	<b>INDUSTRY 3769, SPACE VEHICLE EQUIPMENT, N.E.C.—Con.</b>				
	Castings (rough and semifinished)—Con.				
336910	Zinc and zinc-base alloy:				
	Purchased ..... million lb.	(X)	-	(X)	( <sup>21</sup> )
	Produced and consumed ..... do.	(X)	-	(X)	(X)
336901	Other nonferrous:				
	Purchased ..... do.	(X)	-	(X)	( <sup>21</sup> )
	Produced and consumed ..... do.	(X)	-	(X)	(X)
346200	Forgings:				
	Iron and steel:				
	Purchased ..... do.	(X)	2.2	.3	1.4
	Produced and consumed ..... do.	(X)	2.2	(S)	(X)
346310	Aluminum and aluminum-base alloy:				
	Purchased ..... do.	(X)	2.0	.2	1.4
	Produced and consumed ..... do.	(X)	2.0	(S)	(X)
346326	Titanium and titanium-base alloy:				
	Purchased ..... 1,000 lb.	(X)	2.2	(D)	(D)
	Produced and consumed ..... do.	(X)	2.2	(S)	(X)
	Electric motors and generators:				
	Fractional horsepower electric motors (less than 1 hp):				
362110	Timing motors, synchronous and subsynchronous:				
	Purchased ..... thousands.	(X)	-	(D)	(D)
	Produced and consumed ..... do.	(X)	-	(S)	(X)
362115	Other fractional horsepower electric motors, excluding timing motors:				
	Purchased ..... do.	(X)	(Z)	(D)	(D)
	Produced and consumed ..... do.	(X)	(Z)	(S)	(X)
362120	Integral horsepower motors and generators (1 hp or more):				
	Purchased ..... do.	(X)	.2	-	-
	Produced and consumed ..... do.	(X)	.2	(S)	(X)
	Bearings:				
356201	Ball ..... do.	(X)	-	(X)	.4
	Roller ..... do.	(X)	-	(X)	(D)
	Aerospace type fluid power parts and components:				
349427	Valves (hydraulic and pneumatic) ..... do.	(X)	-	(X)	(D)
349461	Hose or tube fittings and assemblies (hydraulic and pneumatic) ..... do.	(X)	(D)	(X)	( <sup>8</sup> )
359923	Cylinders and rotary actuators (hydraulic and pneumatic) ..... do.	(X)	(D)	(X)	( <sup>8</sup> )
356121	Pumps and motors (hydraulic) ..... do.	(X)	(D)	(X)	( <sup>8</sup> )
356923	Filters for hydraulic fluid power systems ..... do.	(X)	-	(X)	( <sup>8</sup> )
220129	Broad woven fabrics (cotton, wool, manmade fiber fabrics, etc.) ..... million lin yd.	-	-	(D)	(D)
345001	Bolts, nuts, screws, rivets, washers, and screw machine products ..... do.	(X)	(D)	(X)	1.1
285101	Paints, varnishes, lacquers, shellacs, japans, enamels, and allied products ..... 1,000 gal.	(D)	(D)	(D)	(D)
366211	Radio and electronic communication equipment and navigation aids; airborne transmitters and receivers, radar, electronic-type fire control equipment, etc. .... do.	(X)	(D)	(X)	(D)
367001	Resistors, capacitors, transformers, transducers, and other electronic-type components and accessories, except electron tubes and semiconductors ..... do.	(X)	(D)	(X)	(D)
383241	Sighting, tracking, and fire control equipment, optical type ..... do.	(X)	(D)	(X)	(D)
354501	Cutting tools for machine tools ..... do.	(X)	(D)	(X)	( <sup>8</sup> )
342973	Aircraft metal hardware ..... do.	(X)	(D)	(X)	( <sup>8</sup> )
381111	Aircraft flight instruments ..... do.	(X)	-	(X)	( <sup>8</sup> )
382911	Aircraft engine instruments ..... do.	(X)	-	(X)	( <sup>8</sup> )
372440	Aircraft engine parts ..... do.	(X)	-	(X)	( <sup>8</sup> )
369401	Engine electrical equipment ..... do.	(X)	-	(X)	( <sup>8</sup> )
372851	Aircraft propellers and parts thereof ..... do.	(X)	-	(X)	( <sup>8</sup> )
372810	Aircraft parts, except engines and engine parts ..... do.	(X)	(D)	(X)	( <sup>8</sup> )
376480	Guided missile and space vehicle engine parts ..... do.	(X)	(D)	(X)	( <sup>8</sup> )
376920	Guided missile and space vehicle airframe parts ..... do.	(X)	(D)	(X)	( <sup>8</sup> )
362493	Graphite prepreg materials ..... do.	(X)	(D)	(X)	( <sup>8</sup> )
970099	All other materials and components, parts, containers, and supplies ..... do.	(X)	350.7	(X)	<sup>8</sup> 31.6
971000	Materials parts, containers, and supplies, n.s.k. <sup>2</sup> ..... do.	(X)	94.7	(X)	3.0

<sup>1</sup>For some establishments, data have been estimated from central unit values which are based on quantity-cost relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: \* 10 to 19 percent estimated; \*\* 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by (S).

<sup>2</sup>Total cost of materials of establishments that did not report detailed materials data, including establishments that were not mailed a form.

<sup>3</sup>For 1977, material codes 331013, 331015, and 331017 were combined with material code 331019 to avoid disclosing data for individual companies.

<sup>4</sup>For 1977, material code 335143 was combined with material code 335152 to avoid disclosing data for individual companies.

<sup>5</sup>From 1977 Census of Manufactures Supplemental Inquiry: Consumption of Materials, Parts, Containers, and Supplies During 1977 (Form MA-131).

<sup>6</sup>For 1977, material codes 336910, 336901, 349427, 349461, 359923, 356121, 356923, 376920, and 362493 were included with material code 970099.

<sup>7</sup>For 1977, material code 331015 was included with material code 331017.

<sup>8</sup>For 1977, these materials were included with material code 970099.

<sup>9</sup>For 1977, material code 335792 was included with material code 335793.

<sup>10</sup>For 1977, material codes 331012, 331013, 331015, and 331017 were included with material code 331019 to avoid disclosing data for individual companies.

<sup>11</sup>For 1977, material code 331021 was included with material code 331029 to avoid disclosing data for individual companies.

<sup>12</sup>For 1977, material code 331033 was included with material code 331050 to avoid disclosing data for individual companies.

<sup>13</sup>For 1977, material codes 335143 and 335152 were included with material code 335728 to avoid disclosing data for individual companies.

<sup>14</sup>For 1977, material codes 331011, 331012, 331013, 331015, and 331017 were included with material code 331019.



# APPENDIX A.

## Explanation of Terms

This appendix is in two sections. Section 1 includes items which were requested of all establishments that were mailed census of manufactures forms including annual survey of manufactures (ASM) forms. Note that this section also includes several items (number of establishments and companies, value added, classes of products, and specialization and coverage ratios) that were not included on the report forms but were derived from information collected on the forms. Section 2 covers supplementary items that were requested only from establishments included in the ASM sample. Results of the supplementary ASM inquiries are included in tables 3c and 3d of this report.

### SECTION 1. ITEMS COLLECTED OR DERIVED BASED ON ALL CENSUS OF MANUFACTURES (INCLUDING ASM) REPORT FORMS

**Number of establishments and companies**—As discussed in the Introduction, a separate report was required for each manufacturing establishment (plant) with one employee or more. An establishment is defined as a single physical location where manufacturing is performed. A company, on the other hand, is defined as a business organization consisting of one establishment or more under common ownership or control.

If the company operates at different physical locations, even if the individual locations are producing the same line of goods, a separate report was requested for each location. If the company operates in two or more distinct lines of manufacturing at the same location, a separate report was requested for each activity.

An establishment not in operation for any portion of the year was requested to return the report form with the proper notation in the "Operational Status" section of the form. In addition, the establishment was requested to report data on the number of custodial employees, capital expenditures, inventories, or any shipments from inventories during the portion of the year the plant was in operation.

In this report, data are shown for establishments in operation at any time during the year. A comparison with the number of establishments in operation at the end of the year will be provided in the Introduction to Part 1 of the General Summary subject report.

**Employment and related items**—The regular report forms requested separate information on production workers as of a payroll period for each quarter of the year and on other employees as of the payroll period which included the 12th of March.

**All employees**—This item includes all full-time and part-time employees on the payrolls of operating manufacturing establishments during any part of the pay period ending nearest the 12th of the months specified on the report form. Included are all persons on paid sick leave, paid holidays, and paid vacations during these pay periods. Officers of corporations are included as employees; proprietors and partners of unincorporated firms are excluded. The "all employees" number is the average number of production workers plus the number of other employees in mid-March. The number of production workers is the average for the payroll periods including the 12th of March, May, August, and November.

**Production workers**—This item includes workers (up through the line-supervisor level) engaged in fabricating, processing, assembling, inspecting, receiving, storing, handling, packing, warehousing, shipping (but not delivering), maintenance, repair, janitorial and guard services, product development, auxiliary production for plant's own use (e.g., power plant), recordkeeping, and other services closely associated with these production operations at the establishment covered by the report. Employees above the working-supervisor level are excluded from this item.

**All other employees**—This item covers nonproduction employees of the manufacturing establishment including those engaged in factory supervision above the line-supervisor level. It includes sales (including driver salespersons), sales delivery (highway truck drivers and their helpers), advertising, credit, collection, installation and servicing of own products, clerical and routine office function, executive, purchasing, financing, legal, personnel (including cafeteria, medical, etc.), professional, and technical employees. Also included are employees on the payroll of the manufacturing establishment who are engaged in the construction of major additions or alterations to the plant and who are utilized as a separate work force.

In addition to reports sent to operating manufacturing establishments, information on employment during the payroll period which included March 12 and annual payrolls was also requested of auxiliary units (e.g., administrative offices, warehouses, and research and development laboratories) of multiestablishment companies. However, these figures are not included in the totals for individual industries shown in this report. They are included in the general summary and geographic area reports and in the final bound volumes as a separate category.

**Payrolls**—This item includes the gross earnings of all employees on the payroll of operating manufacturing establishments paid in the calendar year 1982. Respondents were told they could follow the definition of payrolls used for calculating the Federal withholding tax. It includes all forms of compensation, such as salaries, wages, commissions, dismissal pay, all bonuses, vacation and sick leave pay, and compensation in kind, prior to such deductions as employees' Social Security contributions, withholding taxes, group insurance, union dues, and savings bonds. The total includes salaries of officers



of corporations, but excludes payments to proprietors or partners of unincorporated concerns. Also excluded are payments to members of Armed Forces and pensioners carried on the active payroll of manufacturing establishments.

The census definition of payrolls is identical to that recommended to all Federal statistical agencies by the Office of Management and Budget. It should be noted that this definition does not include employers' Social Security contributions or other nonpayroll labor costs, such as employees' pension plans, group insurance premiums, and workers' compensation.

The ASM provides estimates of employers' supplemental labor costs, both those required by Federal and State laws and those incurred voluntarily or as part of collective bargaining agreements. (Supplemental labor costs are explained later in this appendix.)

As in the case of employment figures, the payrolls of separate auxiliary units of multiestablishment companies are not included in the totals for individual industries or industry groups.

**Production worker hours**—This item covers hours worked or paid for at the plant, including actual overtime hours (not straight-time equivalent hours). It excludes hours paid for vacations, holidays, or sick leave.

**Cost of materials**—This term refers to direct charges actually paid or payable for items consumed or put into production during the year, including freight charges and other direct charges incurred by the establishment in acquiring these materials. It includes the cost of materials or fuel consumed, whether purchased by the individual establishment from other companies, transferred to it from other establishments of the same company, or withdrawn from inventory during the year.

The important components of this cost item are (1) all raw materials, semifinished goods, parts, components, containers, scrap, and supplies put into production or used as operating supplies and for repair and maintenance during the year, (2) electric energy purchased, (3) fuels consumed for heat, power, or the generation of electricity, (4) work done by others on materials or parts furnished by manufacturing establishments (contract work), and (5) products bought and resold in the same condition. (See discussion of duplication of data below.)

**Specific materials consumed**—In addition to the total cost of materials, which every establishment was required to report, information was also collected for most manufacturing industries on the consumption of major materials used in manufacturing. The inquiries were restricted to those materials which were important parts of the cost of production in a particular industry and for which cost information was available from manufacturers' records. Information on the specific materials consumed is shown in table 7 if appropriate to the industry. Establishments consuming less than a specified amount (usually \$10,000) of a specific material were not requested to report consumption of that material separately. Also, the cost of materials for the small establishments for which either administrative records or short forms were used was imputed as "not specified by kind." (See the Introduction for the importance of administrative records in the industry.)

**Value of shipments**—This item covers the received or receivable net selling values, f.o.b. plant (exclusive of freight and taxes), of all products shipped, both primary and secondary, as well as all miscellaneous receipts, such as receipts for contract work performed for others, installation and repair, sales of scrap, and sales of products bought and resold without further

processing. Included are all items made by or for the establishments from materials owned by it, whether sold, transferred to other plants of the same company, or shipped on consignment. The net selling value of products made in one plant on a contract basis from materials owned by another was reported by the plant providing the materials.

In the case of multiunit companies, the manufacturer was requested to report the value of products transferred to other establishments of the same company at full economic or commercial value, including not only the direct cost of production but also a reasonable proportion of "all other costs" (including company overhead) and profit. (See discussion of duplication of data below.)

**Individual products**—As in previous censuses, data were collected for almost all industries on the quantity and value of individual products shipped. In the 1982 census program, information was collected on the output of approximately 11,000 individual product items. The term "product," as used in the census of manufactures, represents the finest level of detail for which output information was requested. Consequently, it is not necessarily synonymous with the term "product" as used in the marketing sense. In some cases it may be much more detailed and, in other cases, it is more aggregative. For example, "pharmaceutical preparations" was distributed into over 100 items; whereas, "motor gasoline" was reported as a single item.

Approximately 6,000 of the product items were listed separately on the 1982 census report forms. Data for about 5,000 products were obtained in the monthly, quarterly, or annual surveys comprising the Current Industrial Reports series of the Census Bureau. Totals for the year 1982 for these items, as derived from the commodity surveys, are shown in the "products shipped" table (table 6a) together with the tieline total value collected in the census for reconciliation purposes.

The list of products for which separate information was collected was prepared after consultation with industry and government representatives. Comparability with previous figures was given considerable weight in the selection of product categories so that comparable 1977 information is presented for most products.

Typically, both quantity and value of shipments information was collected. However, if quantity was not significant or could not be reported by manufacturers, only value of shipments was collected.

Shipments include both commercial shipments and transfers of products to other plants of the same company. For industries in which a considerable portion of the total shipments is transferred to other plants of the same company, separate information on interplant transfers was also collected. Moreover, for products that are used to a large degree within the same establishment as materials or components in the fabrication of other products, total production and often consumption of the item within the plant was collected. Typically, the information on production was also collected for products for which there are significant differences between total production and shipments in a given year because of wide fluctuations in finished goods inventories. Other measures of output of products with long production cycles were used as appropriate and feasible.

**Classes of products**—To summarize the product information, the separate products were aggregated into classes of products that, in turn, were grouped into all primary products of each industry. The code structure used is a seven-digit number for the



individual product, a five-digit number for the class of product, and a four-digit number for the total primary products in an industry. (See Introduction, Industry Classification of Establishments, for application of the coding structure to the assignment of SIC codes for establishments.)

In the 1982 census, the 11,000 products were grouped into approximately 1,500 separate classes on the basis of general similarity of manufacturing processes, types of materials used, and the like. However, the grouping of products was affected by the economic significance of the class and, in some cases, dissimilar products were grouped because the products were not sufficiently significant to warrant separate classes.

**Duplication in cost of materials and value of shipments**—The aggregate of the cost of materials and value of shipments figures for industry groups and for all manufacturing industries includes large amounts of duplication, since the products of some industries are used as materials by others. With some important exceptions, such as for motor vehicles and parts, this duplication is not significant at the four-digit industry level. However, it is significant at the two-digit and three-digit industry group level because these totals often include industries that represent successive stages in the production of a finished manufactured product. Examples are the addition of flour mills to bakeries in the "Food" group and the addition of pulp mills to paper mills in the "Paper and Allied Products" group of industries. Estimates of the overall extent of this duplication indicate that the value of manufactured products exclusive of such duplication (the value of finished manufactures) tends to approximate two-thirds of the total value of products reported in the census of manufactures.

**Value added by manufacture**—This measure of manufacturing activity is derived by subtracting the cost of materials, supplies, containers, fuel, purchased electricity, and contract work from the value of shipments (products manufactured plus receipts for services rendered). The result of this calculation is adjusted by the addition of value added by merchandising operations (i.e., the difference between the sales value and the cost of merchandise sold without further manufacture, processing, or assembly) plus the net change in finished goods and work-in-process between the beginning- and end-of-year inventories.

Because of the change in instructions for reporting inventories for 1982, the 1982 figure for value added is not strictly comparable to prior-year data. This is explained more fully in the inventories section below.

"Value added" avoids the duplication in the figure for value of shipments that results from the use of products of some establishments as materials by others. Value added is considered to be the best value measure available for comparing the relative economic importance of manufacturing among industries and geographic areas.

**New and used capital expenditures**—For establishments in operation and establishments under construction but not yet in operation, manufacturers were asked to report their new expenditures for (1) permanent additions and major alterations to manufacturing establishments, and (2) machinery and equipment used for replacement and additions to plant capacity if they were of the type for which depreciation accounts were ordinarily maintained.

The totals for new expenditures exclude that portion of expenditures leased from nonmanufacturing concerns, new facilities owned by the Federal Government but operated under

contract by private companies, and plant and equipment furnished to the manufacturer by communities and nonprofit organizations. Also excluded are expenditures for used plant and equipment (although reported in the census), expenditures for land, and cost of maintenance and repairs charged as current operating expenses.

Manufacturers were also requested to report the value of all used buildings and equipment purchased during the year at the purchase price. For any equipment or structure transferred to the use of the reporting establishment by the parent company or one of its subsidiaries, the value at which it was transferred to the establishment was to be reported. Furthermore, if the establishment changed ownership during the year, the cost of the fixed assets (building and equipment) was to be reported under used capital expenditures.

Total expenditures for used plant and equipment is a universe figure; i.e., it is collected on all census forms. However, the breakdown of this figure between expenditures for used buildings and other structures and expenditures for used machinery and equipment is collected only on the ASM form and is subject to sampling error (see table 3d). The data for total new capital expenditures, new building expenditures, and new machinery expenditures, as well as the data for total used expenditures, are shown in both tables 3a and 3d. The figure in table 3a is a census universe total and may differ from the results of the ASM sample shown in table 3d. Since the figures in table 3d are subject to sampling error, they are not considered as reliable as the universe figures.

**End-of-year inventories**—Respondents were asked to report their 1981 and 1982 end-of-year inventories at cost or market. Effective with the 1982 Economic Censuses, this change to a uniform instruction for reporting inventories was introduced for all sector reports. Prior to 1982, respondents were permitted to value inventories using any generally accepted accounting method (FIFO, LIFO, market, to name a few). In 1982, LIFO users were asked to first report inventory values prior to the LIFO adjustment and then to report the LIFO reserve and the LIFO value after adjustment for the reserve.

Because of this change in reporting instructions, the 1982 data for inventories and value added by manufacture included in the tables of this report are not comparable to the prior-year data shown in table 1a of this report and in historical census of manufactures and annual survey of manufactures publications. Inventories and value added data estimated on a basis comparable to the historical data, using the reported information for 1982, are shown in footnote 4 of table 1a. However, the end-of-1981 figure shown in this footnote may differ from the corresponding value published as part of the 1981 Annual Survey of Manufactures.

This difference at the four-digit SIC level is due primarily to the effects of industry shifts. As described in the Industry Classification of Establishments section of the Introduction, ASM noncertainty plants are allowed to shift from one industry to another in a census year; whereas, they are "frozen" in a particular industry in ASM years. Other explanations for this difference include the effects of sampling and processing errors and revisions to end-of-1981 data reported by respondents.

In using inventory data by stage of fabrication for "all industries" and at the two-digit industry level, it should be noted that an item treated as a finished product by an establishment in one industry may be reported as a raw material by another establishment in a different industry. For example, the finished-product inventories of a steel mill would be reported as raw



materials by a stamping plant. Such differences are present in the inventory figures by stage of fabrication shown for individual industries, industry groups, and "all manufacturing," which are aggregates of figures reported by establishments in specified industries.

**Specialization and coverage ratios**—These items are not collected on the report forms but are derived from the data shown in table 5b. An establishment is classified in a particular industry if its shipments of primary products of that industry exceed in value its shipments of the products of any other single industry.

As noted in the Introduction, an establishment's shipments include those products assigned to an industry (primary products), those considered primary to other industries (secondary

products), and receipts for miscellaneous activities (merchandising, contract work, resales, etc.). Specialization and coverage ratios have been developed to measure the relationship of primary product shipments to the data on shipments for the industry shown in tables 1a through 5a and data on product shipments shown in tables 6a through 6c.

Specialization ratio represents the ratio of primary product shipments to total product shipments (primary and secondary, excluding miscellaneous receipts) for the establishments classified in the industry.

Coverage ratio represents the ratio of primary products shipped by the establishments classified in the industry to the total shipments of such products that are shipped by all manufacturing establishments wherever classified.

## SECTION 2. ITEMS COLLECTED ONLY ON ASM REPORT FORMS

**Supplemental labor costs**—Supplemental labor costs are divided into legally required expenditures and payments for voluntary programs. The legally required portion consists primarily of Federal old age and survivors' insurance, unemployment compensation, and workers' compensation. Payments for voluntary programs include all programs not specifically required by legislation whether they were employer initiated or the result of collective bargaining. They include the employer portion of such plans as insurance premiums, premiums for supplemental accident and sickness insurance, pension plans, supplemental unemployment compensation, welfare plans, stock purchase plans on which the employer payment is not subject to withholding tax, and deferred profit-sharing plans. They exclude such items as company-operated cafeterias, in-plant medical services, free parking lots, discounts on employee purchases, and uniforms and work clothing for employees. While the excluded items do benefit employees and all or part of their cost generally is similar to the items covered in the ASM labor costs statistics, accounting records do not generally provide reliable figures on net employee benefits of these types.

**Cost of purchased services**—ASM establishments were requested to provide information on the cost of purchased services for the repair of buildings and other structures, the repair of machinery, and communication services. Included in the cost of purchased services for the repair of buildings and machinery are payments made for all maintenance and repair work on buildings and equipment, such as painting, roof repairs, replacing parts, and overhauling equipment. Such payments made to other establishments of the same company and for repair and maintenance of any leased property are also included. Extensive repairs or reconstruction that were capitalized are considered capital expenditures for used buildings and machinery and are, therefore, excluded from this item. Repair and maintenance costs provided by an owner as part of a rental contract or incurred directly by an establishment in using its own work force are also excluded.

The response coverage ratio shown in table 3d for each of the three types of purchased services listed above is a measure of the extent to which respondents reported for each item. It is derived for each item by calculating the ratio of the weighted employment (establishment data multiplied by sample weight; see section 3) for those ASM establishments that reported the

specific inquiry to the weighted total employment for all ASM establishments classified in the industry.

**Electric energy used for heat and power**—Data on the cost of purchased electric energy were collected on all census forms. However, data on the quantity of purchased electric energy and quantity of generated-less-sold electric energy were collected only on the ASM forms. The cost and quantity of purchased electric energy represent the amount actually used during the year for heat and power. In addition, information was collected on the quantity of electric energy generated by the establishment and the quantity of electric energy sold or transferred to other plants of the same company.

**Beginning- and end-of-year depreciable assets**—The data encompass all fixed depreciable assets on the books of establishments at the beginning and at the end of the year. The values shown (book value) represent the actual cost of assets at the time they were acquired, including all costs incurred in making the assets usable (such as transportation and installation). Included are all buildings, structures, machinery, and equipment (production, office, and transportation equipment) for which depreciation reserves are maintained. Excluded are non-depreciable capital assets, including inventories and intangible assets, such as patent rights and royalties. Also excluded are land and depletable assets, such as timber and mineral rights.

The definition of fixed depreciable assets is consistent with the definition of capital expenditures. For example, expenditures include actual capital outlays during the year, rather than the final value of equipment put in place and buildings completed during the year. Accordingly, the value of assets at the end of the year includes the value of construction in progress. In addition, respondents were requested to make certain that assets at the beginning of the year plus new and used capital expenditures, less retirements, equalled assets at the end of the year.

**New and used capital expenditures**—The data for total new capital expenditures, new building expenditures, new machinery expenditures, and total used capital expenditures are collected on all census forms. However, the breakdown between expenditures for used buildings and other structures and expenditures for used machinery and equipment is collected only on the ASM form. (See further explanation on capital expenditures in section 1.)



**Breakdown of new capital expenditures for machinery and equipment**—ASM establishments were requested to separate their capital expenditures for new machinery and equipment into (1) automobiles, trucks, etc., for highway use, (2) computers and peripheral data processing equipment, and (3) all other.

The category "automobiles, trucks, etc., for highway use" is intended to measure expenditures for vehicles designed for highway use that were acquired through a purchase or lease-purchase agreement. Vehicles normally operating off public highways (vehicles specifically designed to transport materials, property, or equipment on mining, construction, logging, and petroleum development projects) are excluded from this item.

The "not specified by kind" or n.s.k. item for expenditures for new machinery and buildings, shown in table 3d, represents the total machinery and equipment expenditures for establishments that did not break down their expenditures for the three specific categories. This means that for most industries the specific categories are understated.

**Retirements**—Included in this item is the gross value of assets sold, retired, scrapped, destroyed, etc., during 1982. When a complete operation or establishment changed ownership, the respondent was instructed to report the value of the assets sold at the original cost as recorded in the books of the seller. The respondent was also requested to report retirements of equipment or structures owned by a parent company that the establishment was using as if it were a tenant.

**Rental payments**—This item includes rental payments for the use of all items for which depreciation reserves would be maintained if they were owned by the establishment, e.g., structures and buildings, and production, office, and transportation equipment. Excluded are royalties and other payments for the use of intangibles and depletable assets, and land rents where separable.

When an establishment of a multiestablishment company was charged rent by another part of the same company for the use of assets owned by the company, it was instructed to exclude that cost from rental payments. However, the book value (original cost) of these company-owned assets was to be reported as assets of the establishment at the end of the year.

If there were assets at an establishment rented from another company, and the rents were paid centrally by the head office of the establishment, the company was instructed to report these rental payments as if they were paid directly by the establishment.

**Depreciation charges**—This item includes depreciation and amortization charged during the year against assets. Depreciation charged against fixed assets acquired since the beginning of the year and against assets sold or retired during the year are components of this category. Respondents were requested to make certain that they did not report accumulated depreciation.





## APPENDIX B.

# Annual Survey of Manufactures (ASM) Sampling and Estimating Methodologies

### DESCRIPTION OF SURVEY SAMPLE

The Annual Survey of Manufactures (ASM) contains two components. The mail portion of the survey is a probability sample of about 55,000 manufacturing establishments selected from a total of about 225,000 establishments. These 225,000 establishments represent all manufacturing establishments of multiunit companies and all single-unit manufacturing establishments with five employees or more tabulated in the 1977 Census of Manufactures. This mail portion is supplemented by a Social Security Administration list of new manufacturing establishments opened after 1977. The individual establishments were defined as the sampling unit for this sample. This is a change from the previous ASM sample when companies were used as the sampling unit. The implication of this change is that the probability of selection of any establishment relates only to the size of the establishment itself and is independent of the size of the company with which the establishment is affiliated. The efficiencies associated with the change to an establishment sample have made it possible to reduce the mail sample panel from 70,000 establishments in 1978 to 55,000 establishments in the current panel.

The nonmail portion of the survey includes all single-unit establishments that were tabulated with less than five employees in the 1977 Census of Manufactures. Although this portion contained approximately 125,000 establishments, it accounted for less than 2 percent of the estimate for total value of shipments at the total manufacturing level. This portion was not sampled; rather, the data for every establishment in this group were estimated based on selected information obtained annually from the administrative records of other Federal agencies. This administrative record information, which includes payroll, total employment, industry classification, and physical location of the establishment, was obtained under special conditions, which safeguard the confidentiality of both tax and census records. Estimates for data for these small establishments were developed using industry averages in conjunction with the administrative information.

The corresponding estimates for the mail and nonmail establishments were added together, along with the adjusted base-year differences as defined in Description of Estimating Procedures below. The remaining description of the survey sample relates only to the mail portion of the ASM sample.

All establishments with 250 employees or more in the 1977 census were included in the survey panel with certainty. These establishments collectively account for approximately 65 percent of the total value of shipments for manufacturing establishments in the 1977 census. Smaller establishments were sampled with probabilities ranging from 1.000 down to 0.005 in accordance with mathematical theory for optimum allocation of a sample.

The probabilities of selection assigned to the smaller establishments were proportional to measures of size determined for each establishment. For establishments included in the 1977 Census of Manufactures, the measure of size depended directly upon each establishment's 1977 product class values and the

historic variability of the year-to-year shipments of each product class. Roughly equivalent measures of size were assigned to postcensus birth establishments based on their industry codes and anticipated payroll and employment.

The method of assigning measures of size was used in order to maximize the precision (that is, minimize the variance of estimates of the year-to-year change) in the value of product class shipments. Implicitly, it also gave weight to differences in employment, value added, and other general statistics, for these are highly correlated with value of shipments. Individual sample selection probabilities were obtained by multiplying each establishment's final measure of size by an overall sampling fraction coefficient calculated to yield a total expected sample size.

The sample selection procedure gave each establishment in the sampling frame an independent chance of selection. This method of independent selection permits the rotation of establishments into and out of a given sample panel without introducing a bias into the survey estimates.

### DESCRIPTION OF ESTIMATING PROCEDURES

Most of the ASM estimates for the years 1978-1981 were computed using a modified "difference estimate" formula. For each item, a base-year difference was developed. This base-year difference is equal to the difference between the 1977 census published number for an item total and the linear ASM estimate of the total for 1977. The ASM linear estimate was obtained by multiplying each sample establishment's data by its sample weight (the reciprocal of its probability of selection) and summing the weighted values.

This base-year difference was then adjusted to reflect the estimated growth at the four-digit or, in the case of product classes, five-digit based Standard Industrial Classification (SIC) level from 1977 to the year of the survey; for example, 1981. It should be noted that due to processing constraints, the growth factors lagged one year; i.e., if 1981 is the survey year, they were not based on the estimated growth from 1977 to 1981 but rather the growth from 1977 to 1980. This one-year lag had negligible effect on the estimates, particularly at the total manufacturing level where the adjusted base-year difference accounted for less than 1 percent of the estimate for total value of shipments.

These adjusted base-year differences were then added to the corresponding current-year linear estimates, which include the sum of the estimates for the mail and nonmail establishments, to produce the estimates for the years 1978-1981. Estimates developed by this procedure usually are far more reliable than comparable linear estimates developed from the current sample data alone.

The 1982 sample data included in table 3d were also developed using difference estimates. However, since the universe totals for the census year (1977 or 1982) were not known, a modification of the procedure described above was necessary. For each item in table 3d, except purchased services and breakdown of expenditures for new machinery and equipment (see further description in appendix A, section 2), linear



estimates of the publication totals from the ASM mail sample were adjusted by the difference between imputed census totals and the corresponding ASM mail sample estimates of these imputed totals. These imputed totals are obtained by applying industry average ratios to control item values at the establishment level. For example, an imputed total beginning assets figure is obtained by multiplying each establishment's total value of shipments by the industry (four-digit SIC) average for the ratio of beginning assets to shipments.

Separate estimates for the nonmail establishments were not developed. However, their contribution to the publication estimates is reflected in the difference adjustment.

The method of inventory valuation percentages included in table 3c was developed using both complete census information and ASM estimates. The percentages for the four major categories (LIFO, non-LIFO, valuation method not reported, and LIFO reported without associated value and reserve) were derived from the complete census and correspond to the values included in table 3d. The percentages for the specific non-LIFO methods of valuations (FIFO, average cost, specific costs, etc.) are ratio estimates developed from the ASM in conjunction with the census universe estimate for the total of the non-LIFO methods.

## QUALIFICATIONS OF THE DATA

The estimates developed from the sample are apt to differ somewhat from the results of a survey covering all companies in the sampled lists but otherwise conducted under essentially the same conditions as the actual sample survey. The estimates of the magnitude of the sampling errors (the differences between the estimates obtained and the results theoretically obtained from a comparable, complete-coverage survey) are provided by the standard errors of the estimates.

The particular sample selected for the ASM is one of a large number of similar probability samples that, by chance, might have been selected under the same specifications. Each of the possible samples would yield somewhat different sets of results, and the standard errors are measures of the variation of all the possible sample estimates around the theoretical, comparable, complete-coverage values.

Estimates of the standard errors have been computed from the sample data for selected statistics in this report. Except for table 3c, they are presented in the form of relative standard errors, the standard errors divided by the estimated values to which they refer. In table 3c, "absolute" standard errors of the estimates are presented.

In conjunction with its associated estimate, the relative standard error may be used to define confidence intervals (ranges that would include the comparable, complete-coverage value for specified percentages of all the possible samples).

The complete coverage value would be included in the range:

1. From one standard error below to one standard error above the derived estimate for about two-thirds of all possible samples.

2. From two standard errors below to two standard errors above the derived estimate for about 19 out of 20 of all possible samples.
3. From three standard errors below to three standard errors above the derived estimate for nearly all samples.

An inference that the comparable, complete-survey result would be within the indicated ranges would be correct in approximately the relative frequencies shown. Those proportions, therefore, may be interpreted as defining the confidence that the estimates from a particular sample would differ from complete-coverage results by as much as one, two, or three standard errors, respectively.

For example, suppose an estimated total is shown as 50,000 with an associated relative standard error of 2 percent, that is, a standard error of 1,000 (2 percent of 50,000). There is approximately 67 percent confidence that the interval 49,000 to 51,000 includes the complete-coverage total and about 95 percent confidence that the interval 48,000 to 52,000 includes the complete-coverage total.

In addition to the sample errors, the estimates are subject to various response and operational errors: errors of collection, reporting, coding, transcription, imputation for nonresponse, etc. These operational errors would also occur if a complete canvass were to be conducted under the same conditions as the survey.

Explicit measures of their effects generally are not available. However, it is believed that most of the important operational errors were detected and corrected in the course of the Bureau's review of the data for reasonableness and consistency. The small operational errors usually remain. To some extent, they are compensating in the aggregated totals shown. When important operational errors were detected too late to correct the estimates, the data were suppressed or were specifically qualified in the tables.

As derived, the estimated standard errors included part of the effect of the operational errors. The total errors, which depend upon the joint effect of the sampling and operational errors, are usually of the order of size indicated by the standard error, or only moderately higher. However, for particular estimates, the total error may considerably exceed the standard errors shown.

The concept of complete coverage under the conditions prevailing for the ASM is not identical to the complete coverage of the census of manufactures, as the censuses have been conducted. Nearly all types of operational errors that affect the ASM also occur in the censuses. The ASM and the censuses, are conducted under quite different conditions, and operational errors can be better controlled in the ASM than in the censuses. As a result, for many of the census figures, the errors are of the same order of size as the total errors of the corresponding annual survey estimates. The differences between the census and ASM operating conditions also disturb, to some degree, the comparability of the ASM and census data.

Any figures shown in the tables in this publication having an associated standard error exceeding 15 percent may be of limited reliability. However, the figure may be combined with higher-level totals, creating a broader aggregate, which then may be of acceptable reliability.



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# PUBLICATION PROGRAM

## 1982 CENSUS OF MANUFACTURES

Publications of the 1982 Census of Manufactures, containing preliminary and final data on manufacturing establishments in the United States, are described below. Publication order forms for the specific reports may be obtained from any Department of Commerce district office or from Data User Services Division, Customer Services (Publications), Bureau of the Census, Washington, D.C. 20233

### Preliminary Reports

Preliminary industry data are issued in 443 separate reports covering 452 industries (or combinations of industries). Preliminary data for States are grouped and released in reports for each of the nine census geographic divisions.

### Final Reports

Final detailed statistics are issued in separate paperbound reports.

#### Industry series—82 reports (MC82-I-20A to -39D)

Each of the 82 reports provides information for a group of related industries (e.g., "dairy products" includes industries for butter, cheese, milk, etc.). Final figures for the United States are shown for each of the 452 manufacturing industries on quantity and value of products shipped and materials consumed, cost of fuels and electric energy, capital expenditures, assets, rents, inventories, employment, payroll, payroll supplements, hours worked, value added by manufacture, number of establishments, and number of companies. Comparative statistics for earlier years are provided where available.

For each industry, data on value of shipments, value added by manufacture, capital expenditures, employment, and payroll are shown by employment-size class of establishment and degree of primary product specialization. Statistics are given on production of specific products and consumption of energy and various materials by industry.

#### Geographic area series—51 reports (MC82-A-1 to -51)

A separate report for each State and the District of Columbia presents data for industry groups and industries on value of shipments, cost of materials, value added by manufacture, employment, payroll, hours worked, new capital expenditures, and number of manufacturing establishments for the State, SMSA's, and large industrial counties and places. Comparative statistics for earlier census years are shown for the State and large SMSA's. Manufacturing totals are presented for each county and for places with significant manufacturing activity. Detailed statistics—including inventories, assets, rents, and energy costs—are presented only in statewide totals.

#### Subject series—10 reports (MC82-S-1 to -10)

Each of the 10 reports contains detailed statistics for an individual subject, such as: selected materials consumed, selected metalworking

operations, manufacturing activity in government establishments, concentration ratios in manufacturing, type of organization, water use in manufacturing, fuels and electric energy consumed (separate publications for industry statistics, and State and SMSA statistics), textile machinery in place, production indexes, and a general National-level summary.

### Final Report Volumes

Final paperbound reports subsequently are assembled and reissued in clothbound volumes.

- Volume I. Summary and Subject Statistics—data previously issued in series MC82-S.
- Volume II. Industry Statistics—data previously issued in series MC82-I.
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  - Part 2. Major Groups 27 to 34
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- Volume III. Geographic Area Statistics—data previously issued in series MC82-A.
  - Part 1. Alabama to Montana
  - Part 2. Nebraska to Wyoming

### Microfiche

All published data also are available on microfiche.

### Computer Tapes

Selected data—generally detailed information by industry and/or geographic area—also are available on public-use computer tapes. For the selected data, these tapes will provide the same information found in the final reports. Public-use computer tapes are available for users who wish to summarize, rearrange, or process large amounts of data. These tapes, with corresponding technical documentation, are sold by Data User Services Division, Customer Services (Tapes), Bureau of the Census, Washington, D.C. 20233.

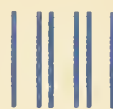
## OTHER ECONOMIC CENSUSES REPORTS

Data on retail trade, wholesale trade, service industries, construction industries, mineral industries, enterprise statistics, minority-owned businesses, women-owned businesses, and transportation also are issued as part of the 1982 Economic Censuses. A separate series of reports covers the censuses of outlying areas—Puerto Rico, Virgin Islands of the United States, Guam, and the Northern Mariana Islands. All published reports and microfiche are sold by the Superintendent of Documents, U. S. Government Printing Office. Appropriate announcements and order forms describing these products are available free of charge from Data User Services Division, Customer Services (Publications), Bureau of the Census, Washington, D.C. 20233.

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